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INFORMATION TECHNOLOGY: PRACTICE, POTENTIAL, LIMITATIONS AND EFFECTS ON THE PROFESSION

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The future of information technology: a personal view

F. H. Sumner

Barclays Professor of Microprocessor
Applications in Industry, University of
Manchester

Paper based on keynote address presented at the fifty-fifth Aslib Annual Conference, University of Oxford, 21–24 September 1982

TECHNOLOGY

Component Technology

THE RATE OF CHANGE in silicon technology can be judged from the fact that graphs of cost per gate or gates per chip are always drawn on logarithmic scales. The following two graphs are from a paper given in 1979 by D. H. Roberts the Director of Research of G.E.C.[1] A variation of the second graph which plots transistors per chip has become generally known as Moore's first law.

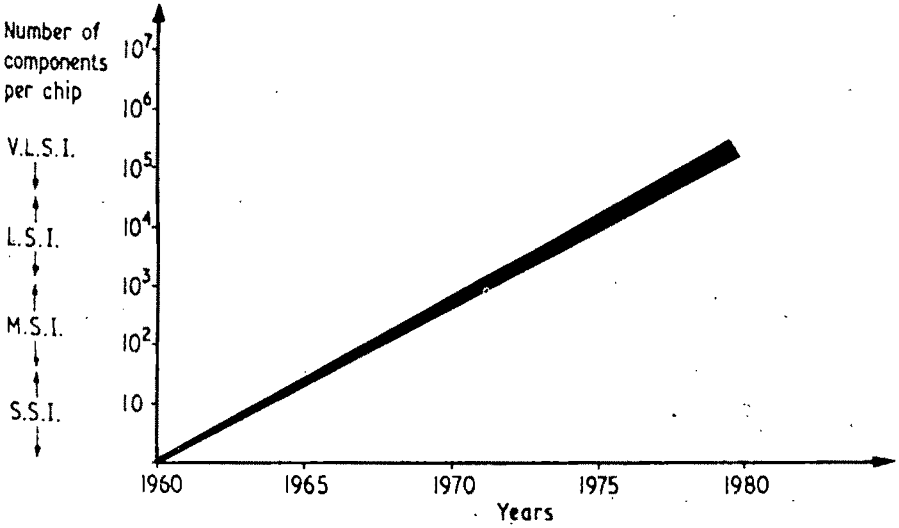

FIG. 1. *Silicon integrated circuits: complexity*

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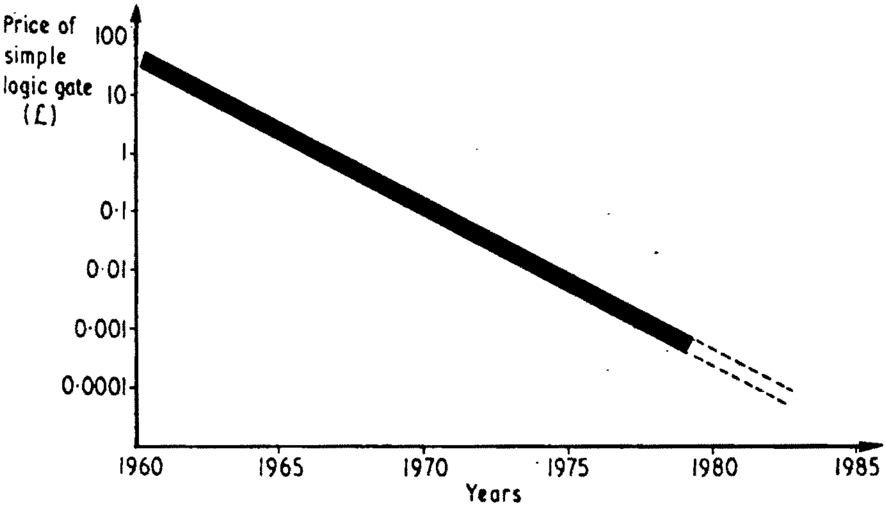


FIG. 2. *Silicon integrated circuits: cost reduction*

Whilst silicon technology is the dominant component technology, there has been extensive research mainly by IBM into the use of Josephson junction devices. There is an excellent description of this work in March 1980 issue of the IBM Journal of Research and Development.[2] The introductory paper by Anacker gives a clear indication of the potential for these devices and the problems that will have to be overcome. For example, as their operation is based on super conductivity they must be operated at very low temperatures, about 4 degrees above absolute zero, the coolant therefore has to be liquid helium. This was one of the main obstacles to the development of Cryotrons in the 50s. The potential for Josephson technology is very exciting.

Anacker gives two attractions of Josephson devices: obviously the first is extremely fast switching, less than 10 psec. The second is extremely low power dissipation, less than 500 nW per circuit.

Other potentially fast technologies are based on III-V ion implantation techniques. These are so called as they use elements from groups III and V of the periodic table, the most widely used combination at the moment is gallium arsenide. These films have a higher electron mobility than silicon and are therefore potentially faster; like silicon they work at normal temperatures. A paper by Eden *et al*[3] gives an indication of the possibilities of gallium arsenide technology. Power dissipations for a 64 gate array are sufficiently low to make VLSI circuits achievable.

The amount of research going on in these new technologies and in the expansion of silicon based technology can be judged from the number of papers published in journals such as the *IEE Journal of Solid States Circuits.* The April issue of this journal is devoted to VLSI and would provide an excellent starting point for anyone wishing to carry out more detailed reading on this subject.

From the point of view of designing and building computers speed is only one of the parameters in the argument: of equal importance is the problem of cooling. Seymour Cray has been quoted as saying that the major problems in the design of the Cray I were associated with plumbing.

Other major aspects of circuit technology after speed and cooling are circuits per chip, availability and price. All these lead Kinniment[4] to the conclusion that silicon based technology is by far the most important for the next 10 years and possibly longer.

Kinniment gives two definitions of VLSI as opposed to LSI. These are less than 2μ line widths and 'the point at which the problem of complexity overwhelms all other problems'. Table 1 produced from Kinniment's paper makes these definitions very clear.

TABLE 1. *Trends in integration*

Date	(a) *Chip Size*	(b) *Minimum Line Width*	$(a/b)^2 \div 50$ *Transistors/Chip*
1960	1 mm × 1 mm	30μ	18
1970	2.5 mm × 2.5 mm	10μ	1250
1980	6 mm × 6 mm	3μ	80 000
1990	10 mm × 10 mm	0.5μ	8 000 000
	1M gates/chip by 1990?		

Cache memories, random access memories (RAMs), and read only memories (ROMs), utilise the same technology as the logic components with the added advantage that the regularity of a memory array makes the design process much easier and permits more efficient use of the chip area. In his IFIP 80 paper Terajima[5] predicts that a four mbyte memory chip will be possible by 1990 at the latest and that ultimately 100 mbits on a 5 inch wafer will be achievable using 1μ channel lengths and defect tollerant designs.

Computer Architecture

Very high performance computers are generally of the type known as Pipelined Vector Processors; another important architecture in picture processing is array processing; a promising new architecture is Dataflow.

Pipelined vector

Computers in which the operation of each instruction is divided into many (the number varies considerably) stages so that many instructions, or the same instruction on many data items, can be in the process of being obeyed at the same time.

Array processing
An array of processors working in step from a common instruction stream but with each having its own data stream.

CRAY I
The CRAY I is a logical extension of the CDC 6600 and CDC 7600. A simplistic definition is that it was in fact just the same with the addition of vector operations using banks of 64 element vector registers instead of scalar registers in the three address operations of the 6600 or 7600.

The features of the CRAY I are well summarized by a table in the Infotech Report 1979.[6]

TABLE 2. *Features of CRAY 1*

- Scalar and vector processing modes
- 12.5 nsec clock period operation
- 64-bit word size
- Integer and floating point arithmetic
- 12 fully segmented functional units
- Eight 24-bit address (A) registers
- 64 24-bit intermediate address (B) registers
- Eight 64-bit scalar (S) registers
- 64 64-bit intermediate scalar (T) registers
- Eight 64-element vector (V) registers (64-bits per element)
- Vector length and vector mask registers
- One 64-bit real-time clock (RT) register
- Four instruction buffers of 64 16-bit parcels each
- 128 basic instructions
- Prioritised interrupt control.
- 1 048 576 64-bit words (plus eight check bits per word)
- 16 independent banks of 64 536 words each
- Four clock period bank cycle time
- One word per clock period transfer rate for B, T, and V registers
- One word per two clock periods transfer rate to instruction buffers (up to 16 instructions per clock period).

CRAY X-MP
The first CRAY-1 was delivered to Los Alamos in 1976. Since then over fifty systems have been delivered throughout the world making it easily the most widely used of all the supercomputers. In April 1982 Cray Research announced a new series the CRAY X-MP with four systems scheduled for delivery in 1983.

Throughout the X-MP sixteen gate arrays are used. These circuits are faster and denser than those of the Cray 1 and result in a clock cycle time of 9.5 nanoseconds and a memory bank cycle time of 38 nanoseconds. This is to be compared with the clock period of the CRAY-1 which is 12.5nsec.

The X-MP is capable of an overall instruction rate of 200 million instructions per second (MOPS). Computation rates of over 400 million floating point operations per second are possible, combined arithmetic/logical operation rates can exceed one billion operations per second (GOPS).

CRAY-2

The next computer system from Cray Research is a continuation of the approach of the X-MP. The CRAY-2 is expected to be six to twelve times as fast as the CRAY-1 and the first customer deliveries are expected in 1985. The clock period will be 4nsec and the system will consist of four identical processors sharing a 4M word memory which will have a cycle time of 12.5 nsec.

High density packaging of components is obviously essential if speeds of this level are to be achieved and size of the total system is expected to be only one tenth of that of the CRAY-1, 26 in high by 36 in long. Cooling is also going to be a major problem with the high packing density. It is in this area that the biggest technological advance has probably been made. Cray applied liquid immersion technology to solve the problem of cooling. The liquid is a pure fluorocarbon. The resulting cooling system is very efficient and enables high density packaging of components.

The fluorocarbon liquid is clear and the consistency of salad oil. However, engineers have observed on the prototype module that when the power is on the liquid becomes somewhat turbulent due to heat generation. The turbulence has been described as ‘quite beautiful to watch’, it also indicates where hot spots are located in the computer. For these reasons, the CRAY-2 may be enclosed in a clear frame.

Perhaps computer design has now become an ‘art form’ which can be appreciated visually.

Array processors and picture processing

A production model of a 64 by 64 element Distributed Array Processor (DAP) connected to an ICL 2980 has now been in operation at Queen Mary College for a few years[7]. It is currently being modified to increase the memory per processing element to 16 K bits as the original size of 4 K bits was found to be rather restrictive.

The most significant development in this area has been the announcement by ICL of a single user workstation comprising a 32 by 32 DAP array connected to a PERQ computer. For problems amenable to the DAP architecture this should give a personal workstation with the power of a CDC 7600.

The most powerful array processor currently proposed is the Goodyear Aerospace Massively Parallel Processor (MPP). This is being designed for use by NASA to process LANDSAT-D satellite images, preferably in real time. The satellite has a bandwidth of more than one million picture elements (pixels) per second, each pixel requires between 100 and 10,000 operations to process it. The required processing rate is therefore in excess of one billion operations per second.

The MPP is an array of 128 by 128 processors each more powerful than the ones in the DAP and it should be capable of a speed of 2 GOPS (two billion operations per second) when doing eight bit integer arithmetic which is generally all that is required in image processing.

Expert systems

The study of artificial intelligence (AI) has been an active part of the computing scene since the development of the first electronic computers. The publicity side of the subject has never suffered from false modesty.Twenty years ago claims were being made for the understanding of continuous speech, automatic translation and the understanding of natural language. Whilst considerable achievements have been made they have rarely, if ever, matched the pre research publicity which has been used to generate funding for many of the projects. This has resulted in considerable distrust of the claims and also in a reduction of funding, in the U.K. the publication of the Lighthill report caused a significant reduction in the funding of AI projects.

In recent years progress has been steady and the published ambitions less extravagant, that is until the appearance of the proposals for the Japanese Fifth Generation.

One highly successful area has been the development of expert systems which have also captured the imagination of workers outside the academic community including many branches of industry. Following a recent meeting organised by the British Computer Society Specialist Group on Expert Systems a report is to be published which is intended to provide a tutorial introduction to expert systems techniques, to discuss the technical context in which they will be further developed over the next decade and to identify implications for effective commercial and industrial exploitation. The report is expected to be published towards the end of 1982.[8]

An expert system can be regarded as consisting of two parts, a knowledge base and an inference machine.[9] A major problem is the organisation of the knowledge base. Several techniques have been investigated but the rule-based approach has become the accepted method. It is the method used in most of the well known expert systems.

Today's 'expert systems' are highly specialised and the aim of research must be to produce general intelligent knowledge-based systems (IKBS). IKBS are the central component of the Japanese Fifth Generation proposals. These proposals look into the future covering the next five to ten years. They do however contain references to two developments which are currently in progress, namely dataflow architectures and the language Prolog which is particularly suited to the solving of problems that involve objects and relations between objects.

Prolog

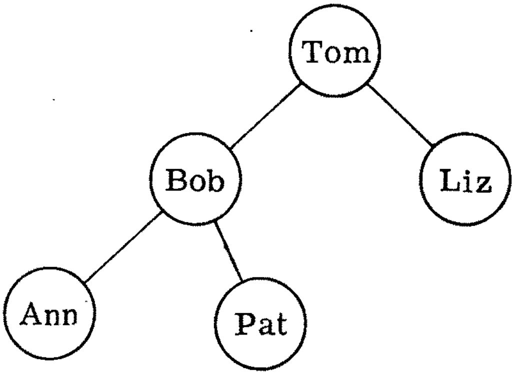
The syntax of Prolog is based on the syntax of first order predicate calculus restricted to Horn clauses only.

Prolog is a non procedural language. The execution of the program can be regarded as the evaluation of relations. Programming in Prolog is very different from programming in algorithmic or procedural languages. Detailed descriptions of Prolog can be obtained from Clockson and Mellish[10]. Bratko provides a nice introduction to Prolog by the use of several examples one of which will be summarised in this analysis.

Consider the representation of a small family tree and the provision of the ability to answer questions on the relationships contained in the tree.

A small database defines the Parent relation. In Prolog this relation can be defined by the following piece of program:

```
parent(tom,bob).
parent(tom,liz).
parent(bob,ann).
parent(bob,pat).
```



The successor relation can be derived from this parent relation. The general rule defining the successor relation can be stated in Prolog by two statements:

```
succ(X,Y):- parent(Y,X).
succ(X,Y):- parent(Y,Z), succ(X,Z).
```

The first statement above says:

> 'For all X and Y, X is a successor of Y if Y is a parent of X.'

The second statement recursively defines indirect successors and can be read:

> 'For all X and Y, X is a successor of Y if there exists a Z such that Y is a parent of Z and X is a successor of Z.'

Now the Prolog system can be asked: Who are the children of Bob? This question to Prolog is:

```
?- parent(bob,X).
```

Prolog's answer is:

```
X=ann;
X=pat
```

We can also ask: Who are the predecessors of Pat? That is, we are looking for all the people whose successor is pat.

```
?- succ(pat,Y).
```

Answer:

```
Y=bob;
Y=tom
```

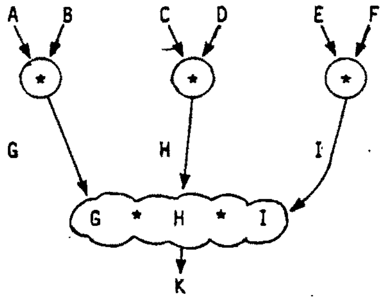
Prolog is an efficient tool for nonnumerical problems which involve objects and relations. It is, on the other hand, in its present form completely unsuitable for more traditional, numeric-type computations.

Dataflow

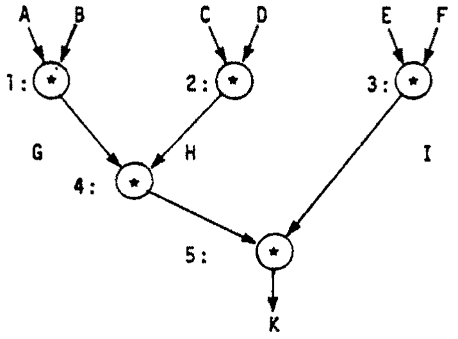
Dataflow is an attempt to exploit the parallelism of the problem. Regular parallelism is that exploited in pipeline vector processors and in SIMD systems and can be expressed by vector notations. An effective notation for instruction level irregular parallelism is required. Gurd[11] develops a graphical notation using as an example a representation of the code for the evaluation of the following sequence of expressions:

```
G=A*B
H=C*D
I=E*F
K=G*H*I
```

Gurd represents the sequence by a data dependence or dataflow graph.



A machine level program graph for the above sequence is shown on the following page.



Remember that the idea of this notation is to allow all potentially concurrent instructions to execute simultaneously. In the original sequential program we would expect the multiplications to be performed in the order [1], [2], [3], [4], [5], producing the answer in five multiplication times. On the graph we can see that either of the parallel execution orderings [1, 2, 3], [4], [5] or [1, 2] [3, 4] [5] will produce the answer in three multiplication times (given at least 3 and 2 multipliers, respectively). The problem for the parallel execution model is to cause one of these parallel execution orderings to occur.

We can illustrate data-driven execution of graph programs by introducing data-carriers (usually called *tokens*, after Petri Net terminology) onto the data dependence graph. Each token carries one data value and is constrained to move (at any speed it can) from tail to head of one dependence arc. Tokens wait at the head of dependence arcs until all other arcs (if any) pointing to the subsequent instruction have tokens at their heads and then the subsequent instruction is executed, taking an arbitrary amount of time before producing result token(s) at its output arc(s). The tokens causing the execution are no longer required, and they can be safely removed from the input arcs.

The figure below shows the flow of tokens, represented by black dots, through the graph as the program is executed. The name dataflow thus becomes obvious.

The approach in the U.K. which has attracted most attention and which is well on the way to achieving a working system is that of Gurd and Watson at the University of Manchester.

The Japanese Fifth Generation

The proposals presented for Fifth Generation Computer Systems (FGCS) must have received more publicity than any previous forward look in computer design and applications.

The Chairman of the Fifth Generation project is Professor Moto-Oka so that the paper by Moto-Oka and Tanaka[12] may safely be regarded as definitive.

In the introduction to their paper they indicate the application areas where computers have not yet been successful.

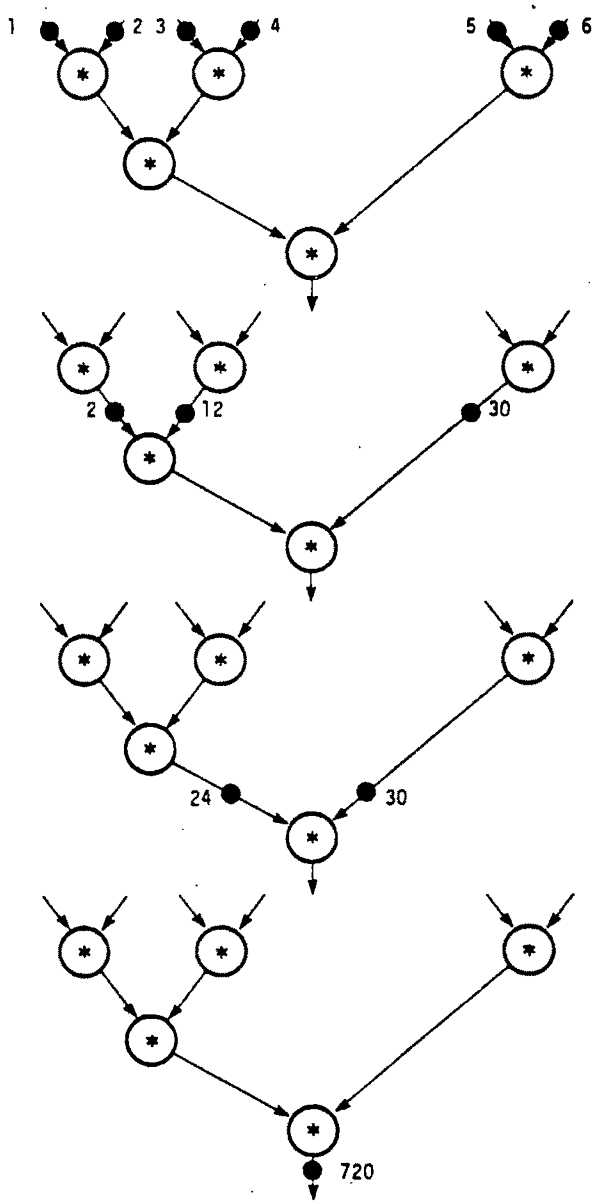


FIG. 3. *Example of dataflow program*

However, there are still some application fields in which computers have not been able to demonstrate their power satisfactorily: these are pattern recognition, natural language translation, summarising capability of sentences, learning capability of past experiences, global decision making through various kinds of information, and so on. We are also facing a serious problem, namely the 'software crisis'. This arises because of the gap between the logic level required by applications and the one offered by high-level languages. As the application field expands more the gap becomes broader and broader. This means that computers should support a higher logic level which is at the same time friendly and familiar for humans. We call such computer systems Fifth Generation Computer Systems (FGCs), in other words, the FGCS are Knowledge Information Processing Systems (KIPSs), they have knowledge bases and are able to infer from the knowledge and solve problems as humans do. Only when computers gain such capability, can they be truly useful and tide us over the software crisis. To realise such high-level computers, various kinds of technology are required such as knowledge representation, inference operation, knowledge acquisition, very efficient parallel execution mechanism, VLSI technology and so on. These technologies are not completed yet, but we think that the time is now ripe to start a project to develop Fifth Generation computers which are based on artificial intelligence.'

Figures 4 and 5 below give the basic configuration of the FGCS.

Prolog and Dataflow appear to have important roles in the research and development programs.

The plans for the intelligent interface, particularly in the area of speech input/output appear very extravagant. The final target is a system which can handle more than ten thousand words, with the exception of professional words, with less than two thousand grammatical rules, and can also analyse syntactically 99% of input sentences correctly.

Massive advances in VLSI technology and improvements in computer performance will be needed for the program to be possible. Figures given suggest expert systems capable of 100,000 times as many inferences per

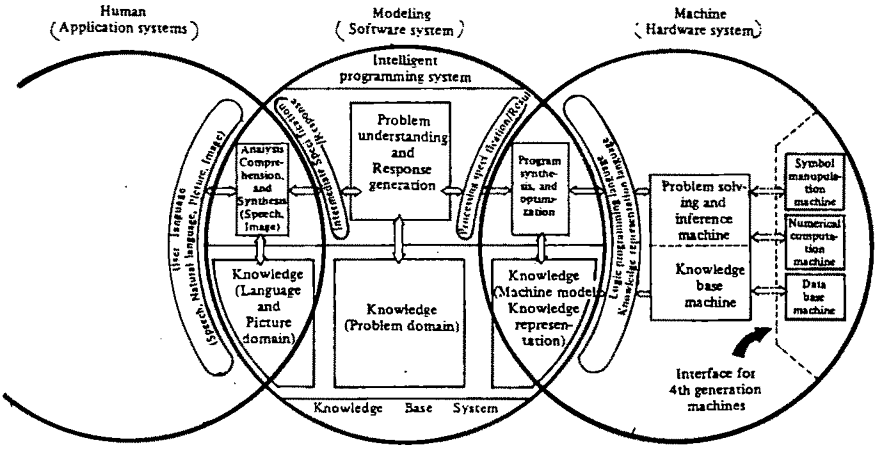

Human
(Application systems)
Modeling
(Software system)
Machine
(Hardware system)
Intelligent programming system
User language (Speech, Natural language, Picture, Image)
Analysis Comprehension, and Synthesis (Speech, Image)
Intermediate Specification (Response)
Problem understanding and Response generation
Processing specification/Result
Program synthesis, and optimization
Logic programming language
Knowledge representation language
Knowledge (Language and Picture domain)
Knowledge (Problem domain)
Knowledge (Machine model, Knowledge representation)
Problem solving and inference machine
Knowledge base machine
Symbol manupulation machine
Numerical computation machine
Data base machine
Interface for 4th generation machines
Knowledge Base System

FIG. 4. Conceptual diagram of the fifth generation computer systems

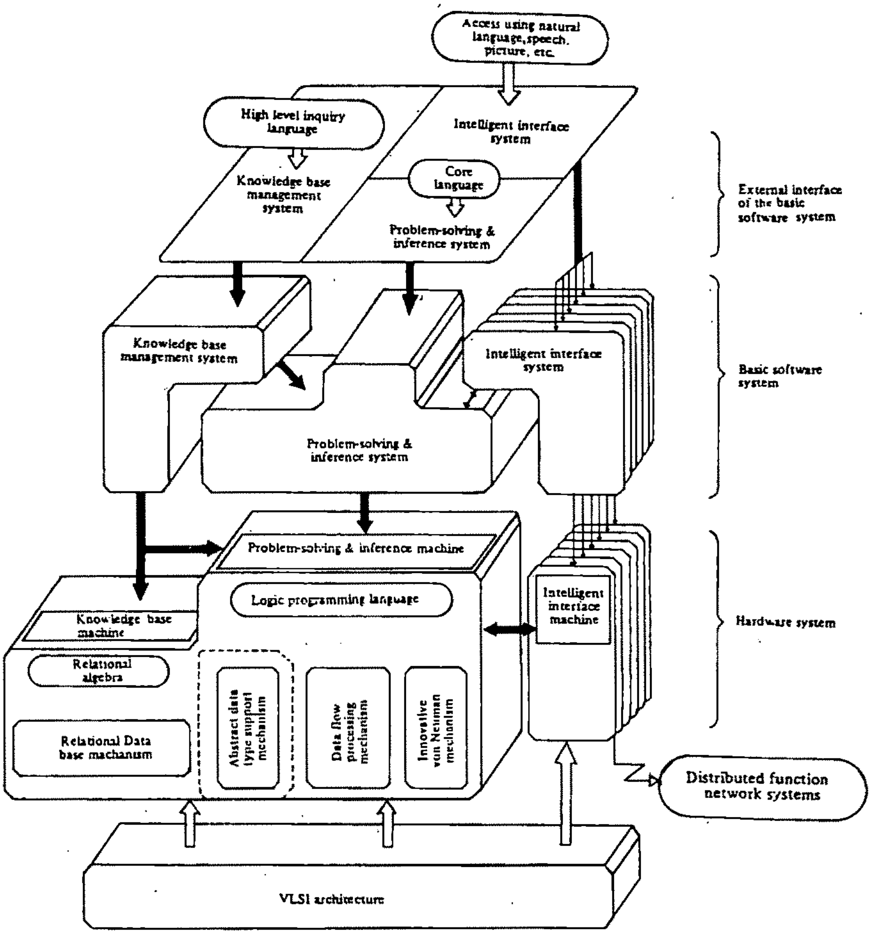

Access using natural language, speech, picture, etc.
High level inquiry language
Intelligent interface system
Knowledge base management system
Core language
Problem-solving & inference system
External interface of the basic software system
Knowledge base management system
Problem-solving & inference system
Intelligent interface system
Basic software system
Problem-solving & inference machine
Logic programming language
Knowledge base machine
Relational algebra
Relational Data base machanism
Abstract data type support mechanism
Data flow processing mechanism
Innovative von Neuman mechanism
Intelligent interface machine
Hardware system
Distributed function network systems
VLSI architecture

FIG. 5. Basic configuration image of the fifth generation computer systems

second as compared with existing systems, a personal dataflow machine with a speed of 10 MIPS and a hugh dataflow system made up of 1000 to 10,000 processors with a store of from one to ten gigabytes.

Finally, an impression of the possible application of TGCS and IKBS is given by some proposals for systems to demonstrate the validity of this approach.

pre-GP health advisor	—	domestic use, low cost; with voice I-O
workshop guide	—	semi-professional e.g. for car maintenance; voice I-O, animated synthetic graphics

teacher's auxiliary — testing, textbook replacement for domestic use, e.g. for maths, languages music; voice I-O, graphics
citizen's helper — for consultation e.g. on planning regulations; voice I-O
tactical decision aid — e.g. defence command and control, business, economics, public service
hardware/software design mate — detailing, validating; graphics
technical translator
fourth generation robot — sensing, planning
office manager/personal assistant — scheduling, prompting, circulating, filing
report sub-editor — checking, amplifying; graphics
'Masterminder' — leisure question and answer, trial of skill
brief writer — summarising, updating; voice I-O, graphics
home servant — monitoring, switching
factory/plant manager — process control; voice I-P, graphics
movie maker — cartoons from text, cues
personnel aide — detecting potential problems, career development needs

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Computer-controlled LV systems

Paul Bradley
Philips Electronics

Abstract from a presentation at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

AN INTELLIGENT INSTRUCTION and training Laser Vision system is created by connecting it to a computer (personal, intelligent terminal, mainframe). The use of such an intelligent system brings two big advantages with it.

The first is that any existing material for instance film, slides, photographs, drawings, etc can be used in a way totally different from its normal application. Films for example are made so that their contents are shown serially. However, when stored on a video disc, the contents of a film change into basic material that can be rearranged, re-sequenced, re-used in a completely different way, with additional texts, with questions and answers that can be linked at will. In short, in a way that lends itself ideally to interactive training.

In such a way an existing film library keeps its value for ever, and what is more, with the LV system, can become a most up-to-date and effective answer to present-day instruction and training requirements.

The second advantage is that the use of an intelligent system leads to economy in making a programme. There is no need, as in the case of a film or tape for repetition or structured summaries. Using the same pictures, presentation can be easily adapted to the user's level of knowledge.

Once the programme is stored on the disc, extra texts can be generated and brought in or changed or suppressed later. Other languages may be added, new questions put or answers checked. Re-sequencing can always be done, all without having to change the original programme.

The intelligent Laservision system is thus uniquely suitable for application in training and instruction. In many cases it might even replace a professional instructor.

Further information is available from the presenter.

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The Xerox 8000 Network System, the 8010 Professional Workstation and some applications for professionals

John C. Brook
Rank Xerox Ltd.

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

THE 8000 NETWORK SYSTEM and in particular, its most exciting component—the 8010 Professional Workstation, began life back in 1970 in Palo Alto, the Xerox Research Centre, in what we now know as Silicon Valley. The researchers at Palo Alto had been asked to develop equipment which they thought would be the kind of product which might be used in the office of the next decade i.e. the 1980's. They developed a workstation called Alto and linked it to other Alto's and printers and disk files using a cable known as Ethernet. The most startling feature of the Alto was the 'mouse', a pointing device for the cursor which users could move in order to point to instructions held on the screen rather than having to remember what those instructions were and type them in on the keyboard as conventional systems required. The Ethernet was a passive cable, enabling workstations on the cable to 'broadcast' information and messages to other stations, files or printers on the network.

From these early developments, we now have a family of products called the 8000 Network Systems products which include the 8010 professional workstations, word processors, personal computers, electronic typewriters, file storage and electronic printers and facilities for external telecommunications.

Let me try and describe the 8010 Workstation. The most familiar sights in your office are the desk, the 'in-tray', the 'out-tray', the filing cabinet and outside in the corridor, the stationery cupboard and the copier. Not to mention all the folders cluttering your desk but giving you easy access to your documents. The 8010 workstation is easy to use because its 'electronic desktop' uses pictures of these familiar objects, so that you can work with them just as you always have. These pictures we call 'icons'. They are displayed in shades of black, white and grey tones on the high resolution screen.

The 'icons' behave just like the objects they represent, so a document icon can be opened or closed and placed in a folder icon just as in a normal office. Other icons give access to other resources on the network as shown by the

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pointer, in-basket, out-basket and filing icons shown below—all designed and tested to ensure that they are easy to recognise.

The 8010 will create bar charts automatically from tables of figures, calculating the bar heights, the scale values, and other properties which you can select from the properties sheet. This enables you to use graphics very easily to convey ideas clearly and quickly.

The 8010 makes filing quick and easy. You can leave documents on your electronic desktop if you wish, or tidy them away into folders, and even put those into other folders. If you wish you can transfer documents to one of the file servers on the network. These shared resources are used for large volume storage, and are accessed simply by copying the document onto the file drawer icon.

Instead of having to remember an instruction and typing it, just look and point at the icon you choose. This is made easy by the 'mouse', similar to the one developed for the Alto,—a small box with two buttons on top and a ball-bearing underneath, which can be moved on top of your desk. The cursor on the screen follows the movement of the mouse. After pointing at the icon, just click the button to select it. A document or folder on your desktop can be copied out to your 'out-tray' icon and immediately sent to an electronic distribution list, or sent for filing or printing by using appropriate icons. The

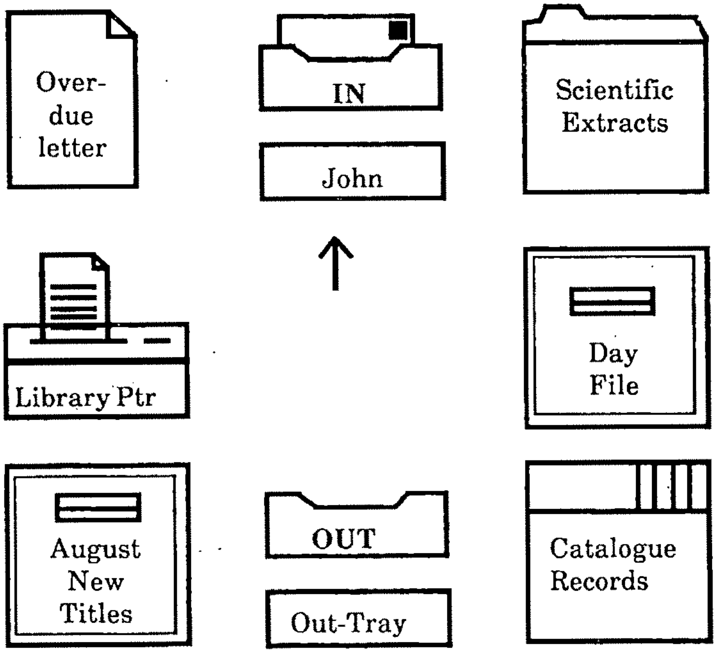

FIG. 1: *Icons in 8010 Workstation*

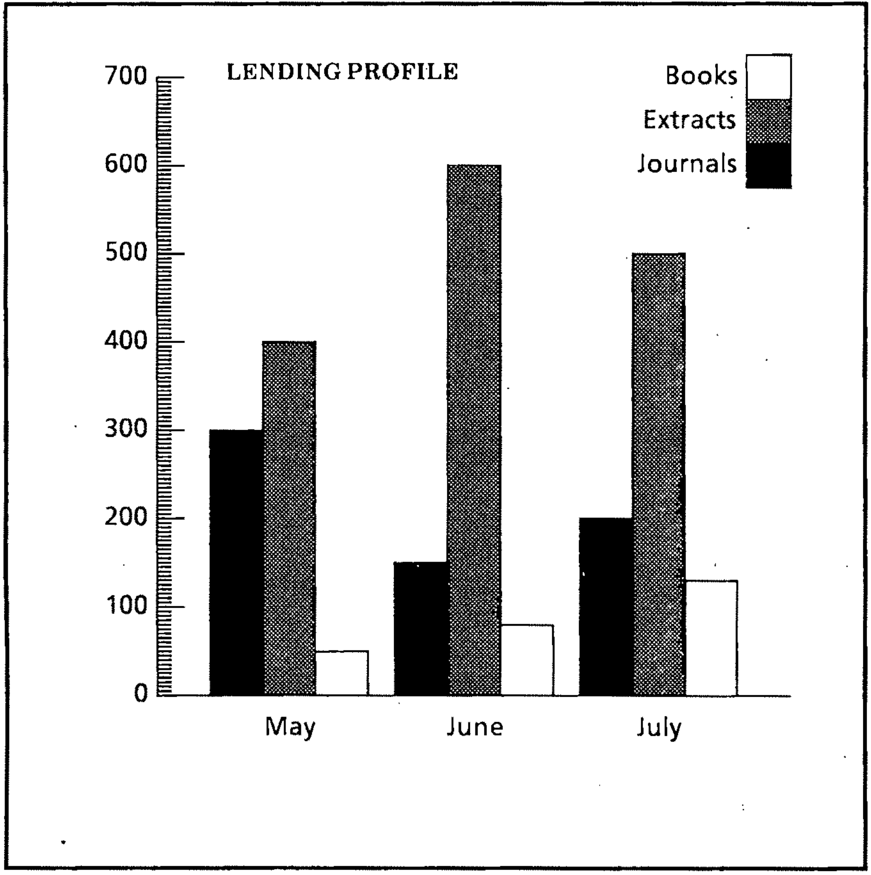

FIG. 2. *Example of graphics produced by the 8010*

simple ‘point and click’ technique is the same whether you are working on text, mailing, graphics or any feature of the workstation.

When you open a document a wide range of type fonts and sizes become available to you, the sizes and fonts of characters are determined by a property sheet which appears on the screen and from which you can choose the particular characteristics you want. So you can choose the **content**, the layout and the ***emphasis*** of your document at the same time. Property sheets contain a selection of visual elements enabling the selection of alternatives by, again, pointing at those elements you wish to select with the ‘mouse’.

You can create documents by simply typing them onto the screen, controlling the content and format as you go, or you can amend existing documents from the shared files. You can open up to six documents at the same time, and copy parts from one to another. Documents created on a

Xerox 860 word processor and sent to you along the Ethernet can be edited and reformatted exactly as you wish.

The input from the standard keyboard can be changed electronically, so the 8010 can create documents in most European languages, including Greek, as well as mathematical symbols, (area $= \pi r^2$) and even Japanese too! Accents and special characters are ≪ ≪pas de problème≫, dit le garçon≫.

Graphics, from complex designs to simple line drawings, can be built up from a set of basic shapes which can be stretched, shrunk, textured, shaded, magnified, copied and moved around the screen by the mouse. Complex shapes can be built up and stored for future use.

Rapid sharing of information is vital to today's business. The mail is slow and the phone does not provide a permanent record. Using the Ethernet Electronic Mail capability is the answer. Documents are simply sent to users' mailboxes from any of the workstations. On the screen, a small envelope will appear in their in-baskets, which can then be opened. Mailing is easy both within one Ethernet and across a worldwide Internet of linked networks, giving almost immediate information exchange between people wherever their place of work.

All the documents on your desktop can be printed exactly as they appear on the screen so that a hard copy of the electronically stored documents is always available on request. What you see is what you get. When printing is required, the document is copied onto one of the printer icons. Multiple copies can be selected, and the document is sent along the Ethernet to the chosen printer, anywhere on the network or any linked network.

That's all very well you may say, but how can it help you in your professional capacity? Well, let us have a look a little more closely at some of the applications you may find useful. The 8010 is a multifunction workstation, so that it can act as a teletype and/or 3278 terminal connected to a remote computer with a large database. From the information stored in the data base, you could access book titles, publishers, authors, extracts which could contain special characters, accents for foreign languages; mathematical notations; scientific formulae and transfer these or translate them into another 'open document' on another screen on the same workstation to produce an index card, a catalogue or any document which required some reformatting of the original output from the computer. These activities can be performed side by side on the same workstation which can then transmit the finished document to other stations on the network or to an electronic printer which will produce any special characters, formulae etc. just as they originally appeared on the screen. Yet another application could be the production of catalogues and abstracts from books, periodicals and papers. The advantage of the 8010 is not that it would keep an up-to-date list (as would any micro-processor) but that it could do this and use all the special characters, graphics and fonts of the original work.

In case you are curious, this paper was originally created in its entirety on an 8010, including all the graphics, the special characters, the different fonts and all the other special features.

TV microform/microfiche systems

Howard Cohen

Antone Systems Limited

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982.

THE PURPOSE OF this paper is to broaden your thinking on information system approaches and to discuss the technologies being used. The paper will be covering the relevant points under the following main headings:

(1) The problems relating to file storage and retrieval
(2) The objectives of a system approach
(3) How do we achieve our objective?
(4) The technology
(5) Conclusions

In many organisations we visit, it is apparent that although conventional filing methods are being used the companies are far from happy about the efficiency or running costs. We are all familiar with the labour intensity of conventional paper-based systems, and the need to perpetually generate copies for no other reason than our need to cross reference files and papers. This problem not only has a bearing on the size and manageability of the system but also on the space and staffing requirements.

Almost all record systems start with manilla file folders. The file folder is not only a storage location, but also serves as a crude index. For instance, in the insurance industry, information is filed only by the insured's name or policy number and likewise only retrieved by the same indicator. There is little if any inter-relationship between files. The manilla file folder system in this application with sufficient file room manpower can work quite well.

It is easily seen that the lack of indexing and retrieval pointers can be as much of a problem as storing the information. Due to the complex nature of files, the responsibility for finding material wanted is often given to the file room staff. The results are then dependent on that member of staff's skill and personal memory. With many files having an active life exceeding 25 years, one can no longer depend on the record staff's skill and memory to effectively locate filed information. All of this is further complicated by the fact that files deteriorate with use. A recent Government Study revealed a 3% misfiling rate by professional and experienced staff. It is very desirable to pre-identify file information that is required and have an automated reporting system that lists records that lists records that have never reached the file. The problems of file and record control are summarised overleaf.

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* Storage
* Retrieval
* Control
* Duplication

From this brief description of the problem and based on working on many document system applications, the following is a good initial set of objectives desired from an information system:

(1) Organised search capability
(2) Rapid retrieval
(3) Management information reporting
(4) Absolute file integrity
(5) Eliminate duplications within the file
(6) Multiple user capability
(7) Remote access
(8) Reduce space
(9) Provide a back-up security file

The overall objective, with regard to the above, is to efficiently be able to locate, recall and view information previously filed. This information can consist of many types, including:

Typed documents
Handwritten notes
Machine generated text
Photographs
Engineering type drawings and diagrams

The speed of access and accuracy in locating specific information is of prime importance. The provision of an index system, either manual or computer based, is imperative in assisting retrieval of randomly filed documents.

Antone Systems Limited has designed a system which meets all of the objective previously outlined. We are using mixed media technology within the system that allows the objectives to be met. Organisations are successfully using computers for cross indexing documentation, system control and management reporting. Automated document image storage and retrieval hardware coupled with electronic document imaging can provide rapid access to multiple users and even at remote locations. Recent developments in image digitisation allow compatibility between the computer data transmission networks, remote CRT displays and remote reproduction equipment. This type of service can be supplied by marrying the computer with a mass document image store and image digitising for remote terminal image display. The users can access all information on special CRT terminals that communicate both with the central computer and master document record file. In a typical request for file information, the user would first make an information search from an online index. After material of interest has been selected, actual images of documents would be retrieved and displayed on the same terminal within seconds.

So how do we go about achieving this overall system solution?

A computerised index is the first step in countering the manilla file folder problem. The index can efficiently store a listing of all documents in the system and provide all the necessary pointers and cross references that may be required for retrieval.

A very simple example of this is a system where all documents are controlled and stored numerically by a document control number. The file folder now carries no indexing intelligence. Good document control along with multiple index cross reference is provided in this type of paper file system. Its operation is labour intensive.

The next level of automation is achieved by converting all documents to a machine retrievable form. Handling paper automatically is very difficult, however, the images of documents can be efficiently handled in a number of ways:

(1) Microfilm
(2) Computer disc
(3) Optical/laser disc

Each one of these storage media has inherent user advantages and disadvantages. However, in our opinion, for the present and for the foreseeable future microfilm is the logical choice as a media for large volume storage. The comparison table (Table 1) briefly indicates the basis of our choice. Needless to say, we will, at the earliest possible time use optical disc technology where applicable.

TABLE 1. *Storage media comparison*

	Microfilm	*Computer Disk*	*Optical Laser Disk*
Module capacity	*500,000*	*6,000*	*2,500*
Average access time	*8 sec.*	*1 sec.*	*1 sec.*
Archival Life	*100 years*	*10 years*	*2 years?*
Resolution	*200 dot/in.*	*200 dot/in.*	*200 dot/in.*
Availability	*1981*	*1981*	*1985/1990*
Media Cost	*£90*	*£180*	*£70*
Module Cost	*£20,000*	*£28,000*	*£2,500*
Data compression capability	—	*8:1*	*8:1*
Online storage (cost per page)	*£0.05*	*£4.67*	*£1.00*

P2473

The conversion of document images to microfilm was begun in the 1920's and this technology is now well developed. Until recently, microfilm was limited to use with an optical reader. Due to this close relationship with the user, many forms of microfilm have evolved. Whether to use roll 16mm, jacket fiche or roll 105mm format is usually determined by user convenience. In addition to these film formats, there are a number of film cartridges or enclosures and image coding schemes to assist in image retrieval. When selecting a film format, consideration also needs to be given to future

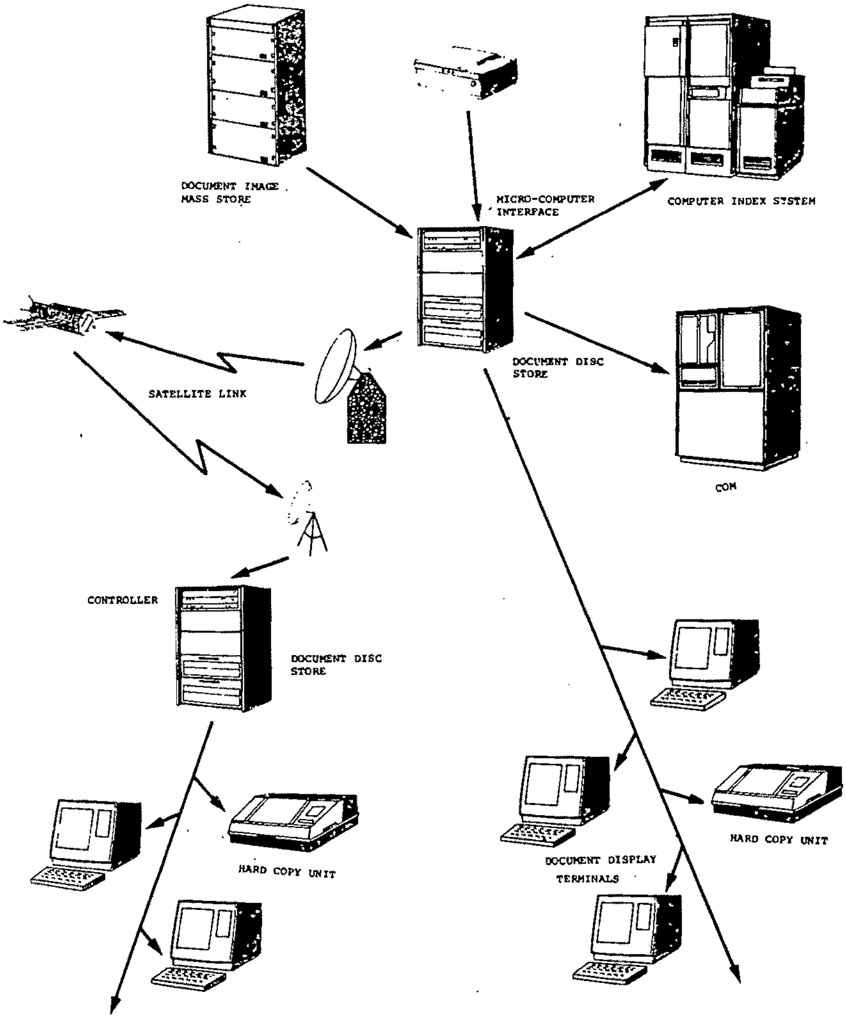

FIG. 1. Automated document management system

upgrading. Too often, little or no thought is given to anything but the immediate requirements resulting in future levels of automation being prohibitively expensive. (A situation not unknown to computer users!)

One of the primary limitations of microfilm has been the need for the database to be located close to the user. Image digitisation now has made it possible to use microfilm as a low cost mass storage media. A scanned digital image from microfilm allows temporary buffering and re-organisation on a computer disc. Images can be transmitted over a data or satellite communication link and be displayed on CRT terminals. Electronic hard copies can also be produced remotely. It is important to point out that the electronic digital image of a document can provide very good image quality. When an A4 page is scanned at 200 dots per inch, the electronic page image contains 4 million bits of information and is equivalent to a half megabyte. The digitising process does not recognise numerics or alpha characters but reproduces the same pattern that was scanned.

This characteristic allows faithful reproduction of handwriting, charts, sketches or whatever page material that was scanned. Since the image is digital, it can be routed over data lines to remote sites. The higher the data rate used, the shorter the time required to transmit an image.

If we look at a simple diagrammatic representation of our system, (Fig. 1) we can immediately see that both microfilm and magnetic media are being used. The user can access an almost unlimited database in terms of both size and type. By selecting required documents through user friendly index dialogues both hard and soft copies can be retrieved in seconds.

Many operating benefits can be achieved by the utilisation of information system technologies presently available. There is no one universal need and likewise no universal system solution that will meet all needs. Documentation comes in many forms, and each require special consideration in developing the overall system. Systems tend to be like buildings, designed to meet specific user needs. Antone Systems specialises in applying these technologies to best meet requirements.

With the online storage cost of 5 to 10 pence per age, an automated information system can be financially and operationally very attractive. Technology allows remote terminals to have the same access to both index and file information via data transmission networks including satellite transmission.

Most systems will reduce file maintenance, delivery staff and save space. The most significant benefits however are in providing the professional staff better access to information and providing better management controls. With the continued increase in labour costs and the decline in costs for computer capacity and related automated equipment, the question no longer is whether to automate but rather, *how soon and in what form.*

Converging technologies: the Teleputer terminal

Mike McCormac

Rediffusion Computers Limited

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

I WOULD IMAGINE that you are thinking that 'Teleputer' is an odd term, and taken in isolation I'd be tempted to agree with you. In it's basic form the Teleputer can be defined as a videotex terminal—with a few extras. The videotex terminal business grew originally on the back of Prestel, and in the early days, Prestel Terminals were in the main converted domestic television receivers. This was because Prestel was originally conceived as a domestic service, but as is widely known, this was not the success that was hoped for.

Prestel then turned to the business market, and in certain sectors, has achieved reasonable penetration. Perhaps the best example of this is the travel business, where now a high proportion of travel agents have access to Prestel through videotex terminals. As Prestel turned to the business market, a market opened up for private videotex systems. Rediffusion Computers was at the vanguard of the development of private videotex systems, and as such can now claim to be the market leader in this technology, certainly in the UK, and probably worldwide.

Once again the travel industry were at the forefront of the movement. Now, most of the major holiday companies have a private videotex system of some sort in action. This move away from domestic usage to business usage created a demand for a better terminal than the converted domestic televisions available up to that time. The market for the business videotex terminal was born. In general, the move was to smaller, higher quality displays, full keyboards in place of the numeric pads utilised up to that point, and in some cases, no facility to receive television programmes at all. The wheel went full circle from adapted domestic television to business terminal.

In hand with the evolution of videotex terminals, over the same period the conventional micro computer moved away from being a hobbyist's device, and found ever greater acceptance as a business tool. Micros running CP/M software packages are now widespread in business, especially in applications such as financial planning and word processing.

As these two situations progressed side by side, a need began to develop to bring the two technologies together. People began to demand access to videotex services, and the power to run their own applications locally. To give some examples, the Travel Agent wanted to refer to Prestel and the

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various holiday company's private videotex systems, and then, later, at the end of the day, update his own local accounts.

The Teleputer concept

From these demands, the Teleputer concept was born. Currently there are two models. The Teleputer One, which is a highly specified business videotex terminal, and the Teleputer Three. The Teleputer Three is the device which I should like to discuss in this paper. In one machine, the Teleputer Three combines four different technologies.

Firstly, there is a *colour television*, so that you can watch all your favourite TV programmes. In practice, many of our customers want this option removed!

Secondly, the Teleputer Three is a powerful *microcomputer*. It has a full, 8-bit, 64 kb processor, runs CP/M operating system, and has two floppy disk drives, each of 500 kb capacity.

Thirdly, the Teleputer Three is a *videotex terminal*, complete with the necessary inbuilt autodialler and modem.

Finally, the Teleputer Three can use an external modem to *interchange data* with other computers.

The combination of these four capabilities makes the Teleputer Three a large step towards the universal terminal, so let's have a closer look now at the device itself.

The Teleputer Three is intended for desk top use, so naturally it has been designed to be compact, and neutral colours have been chosen to blend in with the working environment. It is made up of four distinct elements. The screen has a 14 in diagonal, displays seven colours, and is of a non-interlaced design to give a very steady, clear display. It can show either 960 characters in 40 column mode, for example when being used as a videotex terminal, or 1,920 characters in 80 column mode, for example when being used as a microcomputer.

The sleek plinth houses the micro computer itself, plus the autodialler and modem for videotex use. Keyboards can be of two types, either the full editing keyboard as seen here, or a simplified message sender version. Naturally both versions offer full alpha and numeric keys so that, for example, messages can be typed in. The fourth element is the small cabinet to the right housing the two 5¼ in floppy disk drives—each disk has an unformatted capacity of 500 kb, so a total of 1 mb is available to the Teleputer Three.

The Teleputer as videotex terminal

Reviewing the Teleputer Three first as a videotex terminal, its catalogue of features reads like a who's who's of videotex. Obviously, it is compatible with Prestel, or for that matter, any other private videotex system. In addition to connection to remote videotex computers, via the public switched telephone network, use can also be made of the public data transmission service PSS—Packet Switched System. This is designed for use in applications over long distances requiring the utmost in economy and security.

Secondly, 'Pages', or 'Frames' from videotex systems can be stored locally on the Teleputer Three's floppy disks, so that they can be referred to repeatedly, or later in the day, to save on the costs of dialling to the videotex host computer.

Thirdly, there are two speeds of operation. The normal 1200/75 as used in videotex operation, or for certain applications, 1200/1200 is available to make it possible to send data back to the host computer at a higher rate. A good example of this type of use is the bulk update to Prestel for an Information Provider.

Next, are the integral modem and autodialler for connection to the videotex system. This is based on the use of the latest LUCY chips. The local directory of available telephone numbers is provided by software, and under the software package supplied with the Teleputer Three, up to 30 telephone numbers can be held for use at any time. In comparison with earlier videotex terminals with only four telephone numbers available, this much wider choice gives the Teleputer Three potential to access many more different systems than before.

A choice of keyboards is available to allow either full page creation, including control over graphics, or a simple message sending keyboard. Both keyboards offer full alphanumerics, and are laid out in the normal QWERTY manner as on a typewriter. A whole range of options are available to extend, or customise, the Teleputer Three to particular requirements. For example, both serial and parallel interfaces are available to connect printers.

Finally, under software control, and as a standard feature of the videotex software, you can 'auto access' videotex computers. This means that, for example, you can set a time—say two o'clock in the morning. The Teleputer's inbuilt clock will then wait until two o'clock in the morning, and at that time, dial up the chosen videotex system, call up a list of desired pages, bring them back, and store them on the system's floppy disks. They are then available for use as often as you want, without having to deal the videotex system again.

So, to summarise the Teleputer Three's abilities as a videotex terminal, it is a device which can be used to access Prestel, or for that matter, any private videotex system. For an Information Provider, it can be used to edit, and send pages to Prestel, to maintain the quality of your information on Prestel. Videotex pages can be stored locally, either for reference, or for editing. Finally, completely unattended, while in 'auto-access', the Teleputer Three can dial a videotex computer, and retrieve any selected list of pages or frames. The Teleputer Three is probably the most powerful videotex terminal available today.

The Teleputer as microcomputer

Turning now to look at the Teleputer Three as a microcomputer, once again the device's specification make's interesting reading. In its basic form it has a full 64 Kb of main memory, and utilises the Z80A processor chip. Two floppy disk drives of 500 Kb capacity each are provided, plus a variety of either matrix or daisywheel printers can be connected.

Two operating systems are available—firstly CP*, which includes a BASIC compiler, and CP/M. CP* has been designed to provide easy control of videotex and videotex graphics, while CP/M is now virtually an industry standard. On the Application Software front and considering first CP/M, a tremendous range of packages are available for virtually any function you could imagine. Looking at CP*, Rediffusion Computers can supply packages to do word processing, financial planning, business accounting and data entry—plus a variety of software tools to help you develop your own applications. Being based on the Z80A processor, the Teleputer Three is an 8 bit device. However, the performance of the Teleputer Three has exceeded all the original design criteria laid down. Using the benchmarks conducted by one of the leading monthly micro computer magazines, the Teleputer has out-performed every other 8 bit machine tested, and even out-performed most of the 16 bit machines tested. So, we have a good basic unit as the micro, and this can be expanded and tailored to suit your needs. The main memory size can be expanded from the basic 64 KB to the maximum of 128 KB, to enable you to run even more comprehensive application programs.

If you need to communicate with other computers, other than as a videotex terminal, external modems can be connected to the Teleputer and we can supply the necessary software to provide either IBM 2780 Batch Communications or IBM 3270 Interactive Communications. When you combine this, with the videotex communications inherrent in the device, you end up with a terminal that can be connected to potentially an enormous number of host computers.

Other facilities

Often, you may want to portray information generated by the Teleputer in a form other than as a screen display of a table of figures, or a printed list of statistics. You don't necessarily want to know the absolute fine detail, but you do want to know the trend that is unfolding. For this, you obviously need some form of graphic display. Naturally, the Teleputer Three can display Prestel type graphics, but it can also display a more detailed form of graphics. The Teleputer's graphics allow you to individually address the screen's pixels. There are 240 X 256 pixels on the screen, giving you a massive 61,440 points which can be used to display whatever you want. These are some examples of the type of effect possible with the Teleputer's graphics. Naturally, each point can be coloured differently, so you can get precisely the effect you require.

Moving on to the subject of interfacing to other pieces of equipment, the Teleputer offers three alternative ways. Firstly, there is direct access to the databus itself. Secondly, there is an RS232 interface to allow the connection of a wide variety of peripheral devices. Thirdly, there is an IEEE interface which is widely used to connect devices such as those associated with medical applications and production control. With this kind of flexibility to tailor the

Teleputer to precisely your needs, you can be assured that it's a device that can grow with you as your needs develop.

Applications

So far, we've discussed the evolution and demand that created the Teleputer idea—and we've explored some of its technical abilities. Let's turn now to the areas where you might consider using such a device. We see four main areas of impact, the first, and probably the most significant, is the area loosely known as '*Informatics*'.

A wide range of information is now held on Prestel, and despite past criticism, the quality and variety of that information is improving, almost on a daily basis. A good example is the recent addition to Prestel of 'Skyguide'—part of American Express's pages. 'Skyguide' takes information from a number of the major UK airports, including Heathrow, Gatwick and Manchester currently I believe, and displays it on Prestel. You can, for example, ascertain if a flight has been delayed, cancelled or diverted—what's important is that the information is usually updated at least every fifteen minutes. Another factor having a bearing on the quality of information available, is the ever increasing usage of private videotex systems. These are distributed across all types of organisation, but currently the Travel, Motor and Financial sectors of industry seem to be moving ahead fastest.

As time passes, it is certain that both public and private videotex systems will become ever more valuable sources of reference information. Already a number of Public Libraries have access to Prestel, and I would suggest that it is inevitable that it is only a matter of time before this becomes universal. Alongside this, with the increasing use of private videotex systems, company and business libraries would probably find the scope of information available invaluable today—and essential tomorrow.

This means that, it is going to become ever more important to not only have access to videotex systems, but also, be able to contribute to these services. For both either access or contribution, the Teleputer Three is an ideal device. It allows access to up to 30 different videotex services, and has a full page creation/editing package so that you can contribute your pages to either Prestel or a private system.

The next field to consider is that of *education*. In many areas programmed learning courses are gaining acceptance as a new, and possibly better way, of imparting knowledge in a controlled fashion and to a measurably consistent standard.

As an example, one of the major clearing banks now has a videotex system dedicated to training their staff in various aspects of banking procedure. Previously, staff had to leave their own branch for periods of upwards of a week. They had to be accommodated for that period. Their travelling expenses had to be paid. Both their working and domestic lives were upset. Needless to say, the cost in both financial and personal terms was high. Now, using videotex, an increasing number of training courses are done through a series of half day modules. The student can retire to a room at the back of the bank, and be both taught, and tested, on banking procedure. All the time the system monitors the students progress, and paces the course to suit.

Naturally, the Teleputer Three offers significant advantages over a conventional videotex terminal. Rather than being connected by telephone for the duration of the entire training session, the Teleputer Three can access and store all the pages of each training module in one short burst. The student can then work through them at his leisure, and when finished, redial the host videotex system to send back his results. These can then be checked by the host system to monitor the student's progress. So far, the indications are, that training in this way is easily accepted by the student. He can progress at his own pace, and the training he receives is to a much more consistent standard.

The third area to consider is that of *publishing*. So far little impact has been made in this area, but all the portents are good for the future. At the moment there are a number of Information Providers on Prestel who publish what are, in effect, guides and reviews or journals. Good examples of these include the Consumer Association's *Which?* magazine, who publish details of good buys, bad buys and so on; *Electronic Insight* magazine who publish a database to help potential buyers select suitable products; and HMSO who have a daily service of publishing news from the Government, including a database of Statutory Instruments. This type of use of Prestel and other videotex systems must increase at an ever increasing rate. There is little doubt that as time passes it will become more and more normal to refer to videotex systems for information on prospective purchases, hotels, cars and the like. The beauty of using videotex as a publishing medium, is that it makes it easy to keep the information up to date and it is accessible at any time, with obvious benefits to both the provider and the consumer. Here again the Teleputer Three offers significant benefits. For the Information Provider, it is easy to keep copies of all the pages used on the videotex system, on the Teleputer's floppy disks. They can then be edited and revised offline, with subsequent bulk update to the host videotex system. For the user, videotex pages can be recalled either directly, or, using auto-access. Again, they can then be stored on the Teleputer's floppy disks, and referred to as often as desired, without the necessity to keep redialling the host system. This way, the costs of operation are minimised—though it does open up the question of copyright on videotex pages!

The final field to consider is that of *entertainment*—at the moment there are a number of games on Prestel, but also because the device is a micro, it can run various entertainment programs in its own right.

Future developments

So to review where the Teleputer Three stands today, it can be summarised as a combination of a videotex terminal, a micro computer and a simple graphics terminal. It provides in one package the means to find, look at, and then process information. This then is the essence of the Teleputer

Three—access to videotex, local processing, and the means to present information in ways where the meaning is instantly clear.

So where next? The Teleputer Range as I have described is available today—but the future is possibly even more exciting. In the programme for this conference the Teleputer is described as 'converging technologies', and so far we've seen the convergence of videotex, local processing, communications and graphics—so where could we go next. The answer is just around the corner, and brings pictures into play. The next two models in the Teleputer Series are the models four and five. Model Four takes everything you've seen so far, and adds a video cassette recorder, under logic control of the Teleputer itself.

As an illustration of how such a device might be used, think of it in an educational context. Think of a training sequence, which might go as follows. A series of videotex pages to introduce the subject, and then a short passage of video. After the video, a series of questions on what was shown. Depending on how the student fares, the video might be re-shown, or moved on to display the next sequence. At all times the video cassette recorder is under the control of the Teleputer, so you end up with an easy to use training programme that combines pictures with information and questions.

The final model in the Teleputer series, Model Five, takes even this concept to perhaps the ultimate. In place of a video cassette recorder, the Teleputer Five uses a video disk unit. Now, access to either pictures or video sequences can be at random, and not sequential as on a video cassette. Whole new areas for videotex open up, as information can be combined with pictures.

I hope you would agree with me if I suggest that not only is the Teleputer concept an exciting idea today, but with the insight I've just provided into future developments, it may well hold the key to tomorrow's means of information dissemination and retrieval.

EDITOR'S NOTE

This presentation was accompanied by a set of colour slides which have not been reproduced in the published version. Further information about the Teleputer is available from the author on request.

New office systems technology

R. F. Glyn-Jones

IBM United Kingdom Ltd

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21-25 September 1982

Radical change in the structure of business

I SHOULD LIKE to start by referring to a remark made by Professor Sumner, namely whereas farming occupied over 50 per cent of the working population 100 years ago, today over 50 per cent were employed in information processing. Agriculture has in fact fallen to 3 per cent of the UK working population. In 1850 a farmer produced enough food for 4 people: today he produces enough for 78 people, a twenty-fold increase in productivity in 130 years. However, it now looks as if the farming community is levelling out at an optimum figure.

The same trend is happening in manufacturing. In the USA manufacturing population has fallen from 40 per cent of the working population in 1920 to 22 per cent today. Robotics, process control, 'megaplant' techniques etc. mean that the productivity improvements will continue, probably reaching that 'optimum' is a much shorter time frame than agriculture.

Office workers

Other sectors have, of course, been taking on more employees, such as services, Government and retail trade, but right across all sectors there has been an increase in the number of office workers. We are building office blocks with the same passion that the Egyptians reserved for pyramids.

So, within that declining manufacturing sector, there is a growing office population. A few years ago, 35 per cent of the workforce of a typical UK Company such as ICI, (and 50 per cent of the salary bill) consisted of office workers. The industrial shake-out of the last few years has probably exaggerated that trend. One study shows that 47 per cent of the total UK workforce (11.5 million) are office workers versus 45.4 per cent (11.1 million) who are blue collar, the balance being owners/consultants.

This trend reflects rising 'Communication' skills. I was greatly affected by an account by Malcolm Muggeridge some years ago of how he travelled in the driver's cab in a London Underground vehicle. That driver hardly talks all day—it is a non-communicating job. That episode highlighted for me why we need offices—they are furnaces burning up human communication as their fuel.

If 50 per cent of the salary bill of a manufacturing firm covers office people, then where does it put investment? You can see that attitudes on this subject will have to change radically.

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Analysis of the office

I find it convenient to divide the office into two distinct environments:

1. *Transactional or structured environment*

   This is when clerical transactions are processed. Orders, invoices, payroll, VAT, airline reservations, cheque handling, and so on. Now 'minis' and 'micros' are beginning to automate the smaller transactions.

   This is the environment where productivity is key.

   'Mass computing' techniques are being applied to container traffic, to travel agents making reservations, to retail point-of-sale transactions, car registration, income tax etc.

2. *Information or unstructured environment*

   This is where future products, marketing programmes, advertising campaigns, new production methods, new methods of distribution or transport are planned. This is a creative, innovative environment, plotting the future. The transactional environment records the past, the informational one plans the future.

There is of course a bit of both environments in all of us, but when I address an audience of mixed enterprises and ask them what is the mix of these environments in their enterprise, I regularly get the reply '70 per cent informational, 30 per cent transactional'. This sector looks not for productivity but for 'service', better information, better forms of communication and so on. This informational segment affects management decisions, and the future of the business. It is key to the future of any enterprise: to the future of Britain itself and the western world. Yet it is the least automated of all business areas.

Large computers, minis, and even micro-computers have addressed the transactional applications, high volumes of repeat processing. For the rest of this paper, I address the other environment.

Methods of approach

We are now in the area of 'office systems' or 'office automation'. It is difficult to analyse the 'knowledge worker' in terms of a series of 'applications'. Applications are easy to automate, like word processing. Booz Allen, Consultants in the USA, did some fascinating research in 1980 on Management/Professional Productivity. Their conclusions could profitably absorb a three-day conference, but in raw summary, one of their findings was that this group spend about 25 per cent of their time in low productivity activities which could be greatly reduced by means of a good office automation system. These activities could include the telephone (in 7 out of 10 calls, the person you ring up is not sitting free at his desk); meetings, hunting for information, creating documents and so on. Interruptions are a major cause of low productivity. Booz Allen reckon that 15 per cent of the time of this group can be saved by automation and this is the most expensive group in most enterprises.

Another approach is to look at individuals by professions. For example, a solicitor can be assisted by having online terminal access to large information banks containing legal precedents. Similarly accountants and stockbrokers can use online services which analyse the movements of company shares and profits; research workers can access abstracts of patents or chemical engineering data and so on. There is a great growth of these independent information services.

Learning to 'drive' the system ourselves

We can be fairly certain in assuming that one major characteristic of automation in the knowledge worker environment will be that office workers will 'drive' the system themselves. A parallel can be drawn between the railway system and the motor car, when transport was decentralised. I am told that before 1914 if you bought a motor car, you would have needed to recruit a chauffeur. Now we have to learn to handle computers without the help of the 'chauffeur'.

Let me illustrate my point further. An earlier paper has described the multi-function workstation and the 'Principal' workstation. If you put one on your desk tomorrow and switched on, you would have a blank screen. It would be blank until someone put information into the system which you could access. The big question is who is going to enter that information and ensure that it is what you need.

Harnessing departmental information

I want to outline new ways of harnessing information which is used every day in a typical 'unstructured' department. Let me take a Personnel Department for purposes of illustration.

Information, if you need to interpret it or analyse it, needs to be recorded in 'field' format. Here is an example:

	Field 1 *Name*	Field 2 *Forename*	Field 3 *Age*	Field 4 *Salary*	Field 5 *Dept.*
Record 1	Brown	Arthur	31	8,000	Accounts
Record 2	Green	Roger	52	11,000	Sales
Record 3	Smith	John	21	7,000	Engineering

Suppose you want to know the names of employees who earn over £10,000, you enter into the keyboard of your terminal

```
        FIELD 4  >  10,000
```

If you want to find out those who earn between £10,000 and £15,000 in the sales department:

```
        FIELD 4  >  10,000 and < 15,001
    AND FIELD 5  =  Sales
```

Using this technique you can ask the computer to:

(1) Print a list of all employees under 31 who earn over £10,000
(2) Show on screen all employees over 50 in Sales
(3) You can send a letter to all Accounts department employees telling them they are going to receive a 10 per cent increase. The computer will do the calculations, but this is the interesting fact. If you use a 'user friendly' machine like the IBM Displaywriter which is in the Exhibition today, you can instruct the computer to do this calculation knowing *NO* computer programming language at all. You can use the same technique that you use for calculating your grocery bill.

Database Management Systems

The programmes required to handle this kind of record processing are called Database Management Systems. In some you can record separate files, and the computer will merge them. One file might contain personnel history; another training details; another payroll history; another absentee records. By using a key field, common to all files, a report can be produced, drawing bits of information from each file. There are also 'relational files'. These are comprehensive files, but the computer programme will break them down into subfiles each dealing with one view of the subject matter.

Probably the most important thing today is that almost anyone in an office can 'interpret' these files because the programming is simple—'user friendly' as the phrase goes. Probably the easiest programme in the world today for record processing is available in the 'Displaywriter'.

Personnel Department

Let me develop this theme further still staying in my Personnel Department.

Let us create a file, comprising these fields:

LAST NAME
Middle Initial
First name
Title
Job title
Birthday
Date of joining firm
Basic salary
Date of last increase
Amount of increase
Bonus potential
Overtime/weekend hours
Region
Branch
Department
Grade
Merit rating
Leaving date

Eighteen fields in all. I should point out that this is a 'Personnel Record' and not Payroll. They are quite separate. Payroll is a structured file, my Personnel Record belongs to the unstructured environment. There is only a 15 per cent overlap between Payroll files and Personnel Records.

Here is a list of just some of the things we can find out from this file:

Average salary per grade
Average earnings for engineers
Out of line salaries
Length of Service by job title or department
Average increase in salaries since January by department
How much does each branch cost in salaries
Overtime worked by department
Leaver/hires list
Detailed list of employees per branch
etc, etc, etc

Salary planning can be carried out. We could give a 15 per cent increase to all those with the highest merit rating, then 12 per cent to those with the next merit, and so on, and test it out to find out what the total increase will cost the firm.

In summary we can use this file in these ways:

Routine reports	e.g.	Absentees Salary analysis Hires/leavers
Ad hoc enquiry	e.g.	Management enquiries
Special programmes	e.g.	Recruitment Retirement Training
Planning	e.g.	Salary planning Manpower planning Career development Redeployment New product staff planning

The planning side is becoming especially important. Suppose a company wants to introduce a new product, or a new marketing method? What are the impacts on staff; has the company the skills or does it need to recruit. Will existing skills become redundant? A good manpower planning system, based on a good record system will answer these questions. Furthermore they will raise the status of the Personnel Manager. He will now have the same level of detailed facts at his command as the Financial Director has. It is no accident that in many companies, the Personnel Director is renamed the Director of Human Resources.

There is one more effect of the Personnel Record I need to discuss. Where this file is created by the Personnel Department, it will be used by the

Department and, bit by bit, all members of the department will come to use it in their daily work. This is office automation evolving.

Viewdata

Records and field format enable us to interpret information. They enable us to have information presented in graphic mode as pie charts, bar charts, in colour and so on.

A department needs other sorts of information too. It needs access to manuals, lists, directories, abstracts. An ideal way to store and maintain this type of information is 'private viewdata'. Viewdata can also be used like the airline booking system, for making transactions. Most, if not all, travel agents use viewdata not only for seeing if a certain packaged holiday is available but also for making the reservation. If ever you see someone hanging on the end of a telephone, especially during peak hours, waiting for information or wanting to make a reservation, in any walk of life, then you have uncovered a need for viewdata.

Information centre

The techniques I have described can be applied to any 'informational' environment—marketing, advertising, purchasing, new product development and so on.

What is going to make all of this happen? An important development in large companies is the 'INFORMATION CENTRE'. This is really a group of people, probably reporting to the Computing Manager. But their function is quite new. It is to help end users in the department to develop their own use of Personal Computing. They provide consultancy, education and help; they provide easier access to files and they manage the Personal Computer Service and the link between the PC, the main data banks and the Company networks.

The role of the information scientist

Several papers have already discussed the latest technology. You may have expected me to describe some of the latest IBM technology. The great need now is for offices to begin using the technology we already have.

I believe that if you look back on the growth of successful firms, you will find they were generally pioneers in mastering the latest technology and using it to promote their business, often to seize an advantage over competition, often to develop new fields of opportunity made possible by new technology. Imagination is often the quality most needed.

Many of you are 'information scientists'. It could be argued that the catalyst which is needed to harness Information Technology is the information scientist; or perhaps he or she will be called the 'knowledge engineer' or the 'data architect'. This could become the new profession of the 1980s just as 'computing professionals' mushroomed in the 60s and 70s.

Final comments

I would ask you to take the opportunity to experiment with the Displaywriter. Many of you probably already do interact with files and browse in this way. It is this sort of interface between the Average Office Worker and the Computer which is, I believe, one of the major keys to the future, and I further believe that you as Librarians and Information Scientists, i.e. specialists in Information Processing, are going to have a very special role to play.

On being automated

Dr Hazel Downing
University of Southampton

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

IN ORDER TO explain the effects which word processing (WP) has on the operators who use it, it is necessary to ask why it is being introduced. Taking this as our starting point, we can contextualise operators' responses and avoid the problem of technological determination.

The role of technology and the development of WP

There are some who believe that WP and other automated equipment is being introduced quite simply because it happens to be there; that science and technology progress according to certain natural laws and the arrival of WP is an inevitable fact. In others words, science and technology are subject to inexorable laws like nature itself, and thus beyond human intervention. All human beings can do is to go along with 'progress'. This is a view of science and technology which I reject, quite simply because science and technology are products of human beings and as such are dependent on human intervention. Hence science and technology are not neutral as technological determinism implies. If science and technology are the products of human beings, then it follows that 'science done within a particular social order reflects the norms and ideology of that social order'[1].

This then is my starting point. Word processing, like other recent technological developments, reflects the values and needs of our society. It has been developed and is being introduced with a clear purpose: increasing profitability and decreasing company costs. As we shall see later, WP is currently being marketed with a very clear message to office managers and executives: your offices are expensive, badly organised and inefficient, WP can end all that!

Suddenly, beginning in 1977 in Britain, a host of articles appeared in journals and newspapers proclaiming this message. Reading these articles at the time, one almost got the impression that the WP manufacturers had conducted extensive research on the organisation and management of office work, found them lacking in efficiency and then set about developing ways of correcting the inadequacies. With this (only apparently) naive question in mind, I interviewed representatives from two US companies: the first, the manager of the computer science laboratory of a major office equipment company, the second, the chief sales executive of a company specialising in

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WP. According to the first, the reason why his company decided to go into WP was because the computer scientists who were burrowing away in their laboratory suddenly discovered that they could process words as well as data, and hey presto, they came up with a word processor. But of course, it wasn't as simple as that, for in order to develop their findings, they needed a budget, and in order to get a budget from the financial whizz-men whose concern is with maintaining the company's high profit levels, they had to show there was likely to be some return on investment. Like any sensible profit oriented company, this one did a feasibility study and recognised a high profit potential in the processing of words. So at one level, our computer science manager was correct to assume it developed simply through scientific experimentation, but of course, it was only possible to develop it further because it could be seen as potentially profitable. The sales executive from the second company was more direct. 'Basically,' he said, 'you're looking at dollars. Everything, every concept that comes out in industry, the basic end result, the bottom line which many people don't really look at, or think about, in looking at a definite market, even if it's in its infancy, the long range look is to find out how many dollars can be obtained out of that market.'

So there we have it. Automated office equipment is now a multi-billion dollar business. USA revenues from WP increased from $936 million in 1977 to $1.5 billion in 1978 and the projected figure for 1983 is estimated at $6 billion. With so much at stake the amount of publicity and marketing aimed at promoting the 'office of the future' is not surprising, neither is this prediction by an IBM Vice President in 1979:

> People will adapt nicely to office systems—if their arms are broken. And we're in the twisting stage right now.[2]

Soon after the dollars people gave the approval, the statistics people were called in to justify the need. Suddenly office managers and company executives all over the Western world were faced with the startling truth: they were wasting money. One industrial economist at the Stanford Research Institute calculated in 1975 that office costs had reached nearly half a company's total costs in the USA. Similarly in Britain, we were given comparisons: while in 1950 the office costs of a typical business amounted to one fifth of the total costs, by the late 1970s, the figure was half. Then were were told how labour intensive office work had become: in the USA it is calculated that while investment in capital equipment per industrial worker was $25,000 p.a., the equivalent sum per office worker was $2,000, while by means of a simple exchange conversion, in Britain the picture was similar. Some companies even went so far as to calculate the cost of producing a letter: IBM reckoned that in the late 1970s, a letter cost between $3.80 and $6 to produce, or 40 per cent more than in the late 60s—the odd 80 cents representing one of the lesser marvels of statistical finesse. Phillips contented itself with ignoring the decimal point—it calculated that in the late 1970s, exclusive of author's time, a letter cost £4 to produce.

So the seminars were held, the management consultants briefed, and the expensive glossy coloured brochures were printed. The *Guardian*, the *Observer* and the *Financial Times* produced four-, eight- and sometimes twelve-page pull out supplements on office automation. New companies were created and then swallowed up by the big computer enterprises. As the oil boom waned and dividends were threatened, big oil companies like Exxon bought into the market. Everyone wanted a slice of the profits. Books were written about the microprocessor revolution, the government ploughed money into microprocessor awareness programmes, technology correspondents had a field day, and some of them even went into producing books as well. Some academics even gave up their chairs to become freelance microprocessor consultants, recognising perhaps with some considerable foresight that with education cuts, their jobs might actually be on the line, particularly since they seemed to be spending more time advising all and sundry in the private sector on how best to automate their factories and offices, and less time on their students.

Word processing: the promises

So what did they promise? What was the carrot which was offered to the typical office manager? 'From a secretarial station all work is productive' 'Abolish those time and energy wasting procedures like waiting, walking and wondering' 'Invest in a system that does what you want it to do' 'Maximise secretarial productivity'. But, we were also told that WP would free secretarial workers from the boredom and routine of repetitious typing and permit them to be more creative, using their time in a more interesting way. Really? Or was this just the sugar sweetener on the bitter pill? It did seem strange that people suddenly began to admit that secretarial work was boring, just as suddenly as they began to advocate the paperless office with ecological discourses on the wastage of paper and trees. Such hypocrisy was not, however, unanimous among WP salespeople. It was left to the managing director of Olivetti to spell out the real reasons: 'Data processing,' argued Mr de Benedetti, 'is a continuation of a story which began with the industrial revolution which incorporates the development of abstract terminologies within the development of technologies. Information technology is basically a technology of coordination and control of the labour force, the white collar workers, which taylorian organisation does not cover.'

If Frederick Winslow Taylor could not achieve co-ordination and control of white collar workers, what guarantee is there that word processing will? Yet at the same time, how can we reconcile the two opposing views which I have described, that on the one hand WP will be of enormous benefit to secretarial workers, freeing them from the routine of traditional office work and that on the other hand, it will permit greater coordination and control of them and their white collar colleagues? Of the two my research leads me to conclude that Mr de Benedetti comes closer to the truth. The majority of women office workers will not find their jobs more interesting; many will find they have no job at all, and the majority who remain in office work will find they are subject to new, more intense and depersonalised forms of control.

Co-ordination and control of secretarial workers

'Control' is the key to the introduction of word processors. But the question we must pursue for the moment is why existing forms of control are insufficient and what it is about traditional office work which prohibits the type of efficiency which is the result of taylorian forms of rationalisation as in factory work.

Initially, one relatively minor obstacle is the technology. Typewriters have changed very little since the beginning of this century. Even the introduction of electric typewriters did not, as many people think, have a major overall impact on productivity. The major effect of the application of electric impulses to typewriters was to reduce the fatigue of typing on manually controlled machines. Any increased output from electric typewriters is not the result of increased speed but of more sustained production. In the final analysis, the speed of the typewriter is dependent on the speed of the typist.

Perhaps the major obstacle to office efficiency lies in the way in which women office workers are controlled and the form of organisation of work which stems from that control. We can approach this aspect by considering the question implied in de Benedetti's statement, namely why taylorism did not work in the office. A partial answer was supplied by William Henry Leffingwell as early as 1925 in a book which he dedicated to the Taylor Society entitled *Office Management: Principles and Practices,* a guide to taylorism in the office. There, wedged between lengthy discussions about the most suitable, least time wasting placement of water fountains and an analysis of the use of paper clips, Leffingwell identifies the most prominent obstacle to rationalisation, the 'private secretary evil'. The private secretary, he admitted, may be necessary for the most important executives in a company, but, he asserts,

> there is a constant tendency for persons of lesser importance in official capacities to endeavour to surround themselves with the atmosphere of a great man, and whether or not there is any need for it, they insist upon having a private secretary.

The result of this appalling state of affairs is that:

> the company has on its hands a sub-executive with an exaggerated ego and a spoiled stenographer—two very expensive and superfluous luxuries.[3]

It is no accident that 98.6 per cent of secretaries and typists are women. Since the introduction of the first women into office work in the 1870s, secretarial work has been identified as women's work, and, as is the case with any job which becomes 'feminised', it is downgraded. For instance, in 1871, when the Civil Service was reviewing its employment policy, Mr Scudamore, a Post Office Official, made a lengthy report in support of extending the employment of women. The reasons he gives are worth citing at length since they provide an insight into the ideological reasons why women are still by and large concentrated in low level, routine and low paid work:

> They take more kindly than men or boys do to sedentary employment, and are more patient during long confinement to one place.
>
> The wages which will draw male operators from but an inferior class of the community, will draw female operators from a superior class.
>
> They are also less disposed than men to combine for the purpose of extorting higher wages and this is by no means an unimportant matter.
>
> And female operators drawn from a superior class will, as a rule, write better than the male clerks, and spell more correctly, and where the staff is mixed, the female clerks will raise the tone of the whole staff.[4]

Many things have changed since 1871, but the assumptions upon which Mr Scudamore wrote his report have not. The upper middle class tone may have been tempered slightly. Certainly women are no longer employed to 'raise the tone of the office'—Mr Scudamore was writing at a time when only upper middle class ladies were entering office work—but women are still hired to perform the roles which society expects of them. Unfortunately, I do not have the time to dwell on the historical aspects of secretarial work, although they make interesting reading. The point I wish to emphasise is that women office workers are controlled not as workers but as *women*, and that the whole nature of office organisation and discipline revolves around a gendered hierarchy in which women, like pebbles cast into a pool of water always seem to fall to the bottom.

What makes a good secretarial worker? We all know that she needs to be able to type accurately and at high speed, and possibly take shorthand or use audio equipment; she also needs to understand a filing system, answer the telephone and of course she needs to be able to make coffee. But beyond all this, she has to be a woman. Not just any woman, though. She has to present the correct image, she must be polite and submissive and act according to the patterns of behaviour which society lays down for 'respectable' women.

Take a look at any advertisement for a secretarial job, and in addition to the required shorthand and typing speeds, what else do we find? Neat appearance, pleasant manner, good dress sense, etc. etc. the list goes on. Perhaps one should ask what good dress sense has to do with shorthand and typing? Why should our ambitious copy typist/shorthand typist/secretary have to have her hair done regularly, spend two thirds of her salary on clothes, and make sure her nail varnish isn't chipped? The answer to this is that a secretary is not just a technical worker hammering away efficiently all day on her typewriter, she is a woman who is expected to perform all the functions which it is assumed a woman will do anyway, the training for which she will have received simply by growing up. As a woman she can be paid in flattery and compliments instead of hard cash. As a woman she can elevate her boss's status—even if she is not really a secretary, but just a shorthand/typist—how many firms allow their shorthand typists to call themselves 'secretaries' because they know it not only acts as a cash substitute to the typist, but also keeps their lower managements happy?

As the 'office wife', the secretary will be expected not only to dress nicely, but demurely, she will be expected to remind him of his real wife's birthday, his wedding anniversary; she will sew on his buttons, supply him with coffee throughout the day, buy his sandwiches for lunch, or serve pre-lunch drinks to his clients, she will listen to his problems, protect him from unwanted clients or customers and she will learn to laugh off his sexual advances without appearing to be insulted or upset. All this and more, but she is still only a secretary, and even if—as many secretaries do—she could do his job better than he, she would never be given the chance, because she is only a woman. So she contents herself with the odd compliment and she stays behind after work to finish that urgent letter which he couldn't dictate because he was at lunch all afternoon with a client, and she knows she won't be paid overtime, but she doesn't mind because he appreciates her so much. Of course, if she refused he would be less pleased, and she knows the extent of her job security.

What about those lower down the secretarial hierarchy? They are not of course in such close proximity to a male boss. Nevertheless, the patriarchal relations which exist between the boss and the secretary extend to relations between men and women in offices generally. They are of course paid less, though ironically, they spend more of their time actually typing than those at the top of the hierarchy. For those at the top have to devote so much time looking after the personal needs of the boss. One secretary I interviewed actually spent the majority of her working hours, either typing her boss's personal letters, keeping him supplied with fresh orange juice and coffee and making frequent trips into town (in taxis which he paid for) buying presents for his girlfriends and shopping for his provisions. She didn't mind though, she didn't particularly like typing. So, despite the fact that the performance of these feminine duties reinforces the ideology and practices which oppress women, many women take advantage of them to avoid the boredom of their jobs.

For those secretarial workers who are not in a one-to-one boss/secretary relationship, but share offices with other women, the work is usually less varied and consists mainly of typing. In such situations, where it is difficult to generate much interest in an invoice, or a building specification, most women develop a set of working practices to overcome the routine. Working within the patriarchal relations of control, they can develop an alternative work culture which excludes men. They introduce their own interests into work, and although it is unusual for women not to complete the work they have to do conscientiously (their employment depends on the approval of the men they work for), the work permits them any number of 'natural' breaks to have a conversation with the women they work with, or to visit people in a different office. Because men view this as 'gossip', i.e. unimportant, and because men expect women to do it, managements tend to turn a blind eye and let them carry on—possibly believing that if they reprimanded them, the women would burst into tears.

Within the overall office environment, women play an important role in the eyes of men. In an otherwise austere environment, the general office or the secretaries' office is often the only 'human' place in the company. It is usually personalised, with pictures on the walls, with plants, and with cryptic notices stuck on the back of typewriters proclaiming messages like 'The impossible I can do immediately, miracles take a little longer' or 'You don't have to be mad to work here but it helps if you are'. It is the place where one can go to find a sympathetic ear (men are not prone to discussing their personal problems with other men) and it is usually the place to catch up on the office gossip.

Space and time prevent a more detailed description of the many facets of the 'social office'—sufficient has been said however hopefully to present a picture of a world where the more commonly acceptable forms of stringent 'capitalist' control are absent. But men and women like it that way. Men like the idea of going to work and flirting with the secretaries, having a woman to serve them coffee and look after them, and women accept it because it enables them to create time and space away from the tedium of work, even if they do often become irritated and frustrated by the oppressive aspects of their relations with their male bosses. Perhaps these women should fight back and demand more interesting work? Many have tried and failed, and many keep trying, but for those who don't and content themselves with the company of the women they work with, or with the occasional trips to town to buy presents for the boss's wife/mistress/girlfriend, their response has to be seen as a realistic appraisal of what the real alternatives are—namely none. Offices are renowned for their high labour turnover. In many cases this comes from women looking for that perfect secretarial job, the one they were led to expect from their training. So they answer the advertisement which calls for 'initiative and responsibility' and discover that the only initiative called for is deciding which colour flimsy should be used for the correspondence file or which kind of coffee they should buy for the boss. In the end their participation in the alternative work culture, the endless conversations, pouring over the other secretaries' wedding pictures, the cultivation of pot plants, the extended lunch hours, the lengthy ritual of planning, collecting for and buying leaving/wedding/birthday presents becomes their way of expressing their dissatisfaction with or resistance to secretarial work.

Word Processing: co-ordination and control

Now that word processors have arrived, all this will be changed. And why shouldn't it, you may ask? Well, yes, people are paid to work and work they should. But what happens if women are paid not only to type and take shorthand, but also to be feminine? Then being feminine is part of the job. Take the woman who answers back, the secretary who refuses to make another cup of coffee—what happens to her? She's asked (nicely of course) if she didn't think it was time to look for alternative employment. Or the woman who refuses to dress properly for work? She has reneged on her contract of course, for did not the advertisement specify 'good appearance'? And what of the woman who refuses her boss's sexual advances? And what constitutes a fair day's work anyway? Nevertheless, as the word processor consultants and manufacturers point out, all this is becoming too costly, it's upsetting the balance books, top managers will just have to do without their expensive secretaries because the company's profits are being threatened. As one writer so succinctly sums it up:

> Among the subsidiary benefits management expects to derive from (office automation) is the reduction and thus cheapening of the skills of administrative employees and not least the squeezing out of the minutes and hours of labor power lost in the personal relations and contacts among secretaries and between secretaries and their 'principals'—which is what they mean when they speak of the 'end of the social office'.[5]

The purpose of mechanisation historically, has been to break up jobs into repetitious fragments to enable machines to do the work with the minimum of interference. It has thus been possible to deskill workers, by fragmenting their jobs, their labour is cheapened. Further the fragmentation and standardisation of work permits a more accurate calculation of production and thus of costs and staffing levels.

This is precisely the intention of word processors. WP permits the elimination of costly patriarchal forms of control by transferring control into the machinery itself and into the environment within which that machinery is introduced.

To achieve the correct environment, it is necessary in the first instance to isolate operators from authors or managers. IBM first developed this new form of work organisation. The goal was to split the role of the secretary into the two main components of her work: the technical component was to be concentrated in a word processing centre (WPC) and a severely thinned down secretarial staff with no typewriters would be responsible for performing administrative duties for a group of managers. They would presumably also be expected to perform the function of 'hostess', receiving and entertaining clients, or could that, like the other domestic duties performed by the secretary, such as plant care and flower arrangements, be contracted out?

I visited the WPC serving the administration department of a large Californian university. The supervisor of the centre described it as a 'controlled environment' which permits management 'to secure more productive hours'. Absent from the centre and the work of the operators are all those small tasks which she described as 'interruptions in the real work of keyboarding'—there are no telephones, no sorting of the mail, no messenger tasks and no visitors. As she said 'The centre actually does keyboarding. So most of the hours that are spent in a WPC are productive hours'. Is there no variety, I asked her? No. As she tells applicants for jobs, 'you really like to type'—and if they don't . . . Most of the work done in the WPC comes via the dictation equipment which is controlled by the supervisor. She logs it in, records the amount of time, gives it a log number, and gives it to the operators as they become free for more work. The operators then have to work within set time standards. One of the operators expressed her feelings about the work:

> 'It's very strange because you never feel like you have your own work, you don't generate your own work, you don't generate anything at all. You're not supposed to think.'

This dictation system is quite human in comparison with some which are on the market, labelled variously and symbolically 'Timemaster', 'Mastermind' or 'Thoughtmaster'. They too work via the internal telephone network. On setting up the system, a time study will have been conducted and each operator's keyboarding speed timed and recorded. The dictation equipment will thus have a record of each operator's speed, what s/he is currently working on and how long the current work will require for completion. It can then route recorded material to the next 'vacant operator'. The operators are thus fed work continuously, they never know when the work is likely to finish or when they may expect a break. The equipment also enables managements to keep a record of each operator's 'turnaround time' and thus control operators' productivity. As *Business Week* pointed out this form of dictation system is the 'key to the WP center concept'[6]. The *New Scientist* was slightly more suspicious: reporting on the dual purpose of logging the time spent, it agreed that it 'could help to keep track of letters which had been sent out from a busy office but never elicited a reply', on the other hand, 'it could have a more sinister use in pin-pointing workers whose output had fallen beneath the required level'.[7]

Central to the WPC concept is the elimination of contact between bosses and secretaries, or originators and operators as they now become. Even typing pools did not eliminate this contact altogether. As was noted in studies done in the 1950s, typists would gravitate to one man or department, and individual managers would select their favourite typist to do their work.[8] In the WPC however, this is achieved in various ways. For instance, spatially: the supervisor sits near the door and permits no contact between visitors and operators, he or she is the only person permitted to decide who does which piece of work. Secondly, the work becomes standardised, which means that individual typists lose control over the format of letters and documents. Letters are set out according to a very rigid format: so many lines down from the name and address of the addressee to the salutation, so many lines down to the subject heading, the positioning of the reference and date, etc. Personal habits and skills must take second place to the need for conformity. It is essential that no one operator may be identified from her personal letter layout. Another way of avoiding identification is by ensuring that the reference remains anonymous. In traditional office procedure, the reference will indicate who the typist was, i.e. JS/JB/1234 would give the name of the author (JS=John Smith), the name of the typist (JB=Jane Brown) and the case/company/order number. In the WPC, the same reference would read JS/WPC/1234.

The elimination of personal contact can however also be beneficial to women, particularly those with experience of unpleasant bosses. As one woman expressed the change:

> 'It's really like being a technician on a unionised job. I worked for

> a real shithead boss. I faced every day with trepidation. Had he had a fight with his wife? It really affected my day. WP work is standardised. You just come in and do it. The class division is pretty plain—they're employers, you're a worker and there's no reason to get emotionally involved.'

For women who have had experience of bad bosses or sexual harrassment, WP presents the opportunity of avoiding contact with men and of shedding the prescribed workrole which requires that combination of femininity and submission I have described. The operator need only have cursory contact with male executives. So women need not worry too much about their appearance, as Carolyn one of the operators in the University told me—she now buys the cheapest clothes she can find for work and saves herself a considerable amount of money and worry.

Another example of a WPC is that of the San Francisco branch of a large US bank. There sitting in rows with about 2½ square feet of space sit 110 word processor operators (of whom nine are men). There are two doors to the room, with a rule which specifies that one is for entering and one for leaving. One person is assigned to each group of 30 people to monitor how often the person goes to the toilet and how long s/he spends there—though this is in fact provided by the monitoring device in the equipment which shows how long each operator is absent from their work station. The company has a set time allowance for toilet requirements and if an individual spends more than the time permitted, this is noted down in her/his report. Talking is not allowed, along with eating and drinking at the work station. At first when the WPs were introduced, the operators liked the novelty, but as one of the operators told me

> 'everybody was excited to learn this new thing that was going to help alleviate boredom and make like easier, and then they found out that they didn't do that at all—in fact they made it more boring. People felt that they were plugged into machines, that they were appendages to machines rather than people performing functions with other people.'

They used to have jokes, she said, about how they expected that soon they would be chained to their desks and be given catheters so they would never have to go to the toilet.

WP permits extensive managerial control through the monitoring devices which are built into the equipment. They give information on how much time each individual spends at the work station, and how much work they have produced. In the Bank, the standards were continuously being raised. When Caroll first started working there, the standards were 8,000 keystrokes an hour and when she left after 5 years they were 12,000. Operators are paid according to their productivity and raises and evaluations are set accordingly. The effect on the operators has been a massive increase in tension as they push themselves to increase their output.

In contrast to the generally accepted view, offices are not particularly safe places to work in. Often lighting and heating are inefficient and office workers are subjected to a host of lethal chemicals in stencil correcting fluids, white correcting fluids, from photocopiers and duplicating machines, resulting in headaches and nausea. They may also suffer from badly designed furniture which gives rise to incorrect posture, and hence back-ache.[9] The office of the future gives rise to new problems. Carolyn from the University WPC described the effects of working with WPs: 'depression, irritability and anxiety'. Because she is tied to her desk all day, she has to eat dinner standing up because she needs to walk around. Since working at the centre she's experienced dizzy spells, headaches and vertigo. One of the other operators suffers the same problems and more: since working in the WPC she has suffered migraines for the first time in her life.

A number of WP operators, both in the US and in Britain have reported headaches, puffy eyes, and blurred vision. In desperation, a Leeds WP operator saw an optician and was told she would have to start wearing spectacles if she continued working with a VDU. The optician also told her that her problem was not unusual, he had tested the eyes of a number of women who all worked with VDUs and all suffered the same eye problems. Caroll from the Bank reported stress related problems: neck and shoulder pains, as well as eye problems, particularly she would see flashing lights as after-images from the VDU screen even at weekends and on vacation. The static thrown out by the VDU also increases the possibility of dermatitis. One operator reported a skin rash down one side of her face and it happened to be the side which was turned towards the screen as she angled her head to read from copy at the side of her machine.

The stress related problems are all directly related to the way work is organised in the WPC and the increased pacing of work. Since all peripheral secretarial tasks are removed from the WPC, such as filing, photocopying, duplicating, making coffee, etc. the operators have no excuse but to keyboard all day long and work to quotas and standards. It is not only that they no longer have the variety, or the possibility for variety, it is because their previous skills are now redundant. I do not agree with those who argue that word processing involves a 're-skilling' or 'up-skilling'. In my estimation, the introduction of WP involves not just a technical deskilling but also a deskilling in terms of control. The speed and accuracy in typing which takes years to perfect now count for nothing, as the machine permits almost instantaneous error correction, and performs all those functions which were once the skilled typist's stock in trade—setting out the document neatly, doing tabulation work, centering headings, aligning margins. All the operator has to learn is which button to press and then always according to a set format. Certainly, it is true that much of the boring repetitive typing is eliminated, but at the same time the operator finds that she will be expected to produce more and more quickly, and in some cases where the printing machine is situated in a separate room she will no longer even see what she has keyboarded. She now works to the dictation of the machine, and in all but a very few cases, control will pass completely into the equipment, and thus to management.

Along with the elimination of repetitive typing goes the elimination of a large number of women's job. In almost every case where word processors are introduced in large companies, the aim is always to save on staffing. Where one WP can do the work of 2½-5 typists, the net overall saving to a company is anywhere between one third and one half of the existing typing staff. The predictions about the effects on jobs of new technology are widely known. Government, industrialists and management consultants predict a wonderful future with an increase rather than a decrease in jobs. Other predictions have not been so positive and some frightening figures have been produced which indicate in some instances 5 or 6 million unemployed by the year 1985. The truth probably lies closer to the predictions of the pessimists, though whether in overall terms the unemployment is caused directly by the recession or directly by technology is often difficult to determine. Nevertheless, there is evidence that some companies are taking advantage of the recession to look for ways of pruning their staffing levels both in production and administration. Those representatives of management, whom I have interviewed, state quite clearly that their aim in investing in word processing has been to trim down their secretarial support staff and make their own lower managements more efficient. The job loss has in most cases been achieved through natural wastage, although in at least one case that I know of, it was achieved by introducing the equipment and then giving redundant shorthand typists a choice of jobs—delivering the internal mail or nothing. This is generally called 'redeployment'. Natural wastage does not of course involve firing people and it avoids the cost of paying out redundancy money, but those to be hit are re-entrants to the labour market—women who have been forced to give up paid work for unpaid full time child care, and school leavers.

Some thoughts for the future

So are we in the process of creating living automata? Let me answer that by subjecting you to a lengthy, but not altogether boring, quote from a systems engineer with the unlikely name of Robert Boguslaw:

> Our immediate concern let us remember, is the exploitation of the operating unit approach to systems design, no matter what materials are used. We must take care to prevent this discussion from degenerating into the single sided analysis of the complex characteristics of one type of systems material, namely human beings. What we need is an inventory of the manner in which human behaviour can be controlled, and a description of some of the instruments which will help us achieve that control. If this provides us with sufficient handles on human materials so that we can think of them as metal parts, electrical power, or chemical reactions, then we have succeeded in placing human material on the same footing as any other material and can begin to proceed with our problems of systems design. There are, however, many disadvantages in the use of these human operating units. They are somewhat fragile, they are subject to fatigue, obsolescence, disease and even death. They are frequently stupid, unrealiable

> and limited in memory capacity. But beyond all this, they sometimes seek to design their own circuitry. This in a material is unforgivable, and any system utilising them must devise appropriate safeguards.[10]

Readers may draw their own conclusions about the body of that statement, with the proviso that it was meant seriously. One aspect concerns me here and that is Mr Boguslaw's concern that human beings sometimes seek to design their own circuitry. This after all is the nature of human beings, they do have the capacity to determine their own lives and when they find themselves in situations which they do not like, then they usually find some way of resisting or fighting that situation.

Let us return once more to the Bank. When I spoke to one of the many vice-presidents of the bank, the one responsible for the WP system, he explained to me in passing that having adopted the IBM approach to the WPC wholeheartedly and unreservedly, the Bank was now rethinking its 'philosophy'. He talked elusively about scheduling problems, that productivity per operator seemed to be declining, and hinted that this was because people were getting to know too much:

> 'They now know more about what potential there is and feel as if they know enough, they would want to control it and have it in their operation and therefore have more direct influence over turnaround times. There's a danger in that.'

He would not elaborate on what had happened to cause this shift in policy. But later in my interview with one of the operators the truth came out. The operators had grievances, and when these grievances weren't dealt with they developed their own ways of showing their dissatisfaction. They discovered the code necessary for bringing the system down for maintenance, and then gained 10 or 15 minutes time before it could be brought up again. They discovered that strong magnets can erase computer tape and even though it meant that they had to do the work again, they derived some interim satisfaction from knowing that the bank's deadlines weren't being met and the customers weren't satisfied. And occasionally, when things got bad, the word would go down the line and 110 operators would all stand up at the same time and go to the toilet. But when things became really unbearable, they would 'forget' to key in their personal reference code which was necessary for their productivity count, and would proceed to key in obscenities which would come out on the print out to the customer, and because the work was standardised, no one knew who had done it.

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Information technology—here and now benefits

Michael Aston

National Co-ordinator for Computer
Based Learning

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INFORMATION TECHNOLOGY has been described as the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronics-based combination of computing and telecommunications. In this short paper, I intend to offer some evidence of the benefits afforded by IT and will confine this to the field of learning and education, which must affect us all if we are to give, and perhaps receive, a good service within the library.

With the growth of distance learning, self-paced learning, individualised learning and the need to continue to learn throughout one's lifetime as career patterns change, the roles of teacher and librarian merge towards the common goal of knowledge transmission. A new partnership is developing between the librarian, the computer and the teacher. Each have distinctive qualities to offer, but the combination of all three can provide a formidable force in the learning process.

Her Majesty's Government has recognised the importance of information technology by investing in a number of projects over the last two years. Over £250 million has been allocated to research, development and action in such areas as fibre optics, computer aided design and the 'office of the future'. One such project is the Department of Education and Science Microelectronics Education Programme funded at £10 million to run from March 1980 to 1984 in England, Wales and Northern Ireland. Scotland has its own programme. The aim of the MEP is to help schools to prepare children for life in a society in which devices and systems based on microelectronics are commonplace and pervasive. In addition, the Programme aims to help teachers to use the technology to encourage learning in the children that they teach. In summary, learning about the technology and learning using the technology. The strategy is one of regionalisation, dividing the UK, less Scotland, into 14 areas each with a director, a regional information centre and four in-service training co-ordinators to cover the domains of computer based learning, computer studies, control and technology, communications and information systems. In addition, provision has been made for children with special needs of all kinds. The money is being spent, over two-thirds regionally, on

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curriculum development, software, in-service training and information provision. The Department of Industry has contributed to the project by providing £4 million worth of hardware to secondary schools and is likely to spend around £10 million likewise in the primary sector. In each case on a pound for pound basis.

What does this all mean for the teacher?

There has been a variety of response.

> 'Shakespeare didn't need a computer.'
> 'What's all the fuss about?'
> 'ROM, RAM, HEX and Front Panels' from the 'expert' teacher who can be the worse possible kind of missionary for the rest of the school staff.

The majority of teachers do not fall into any of the categories above but, when shown examples of good quality software, ask if they can use the facilities in their classroom. Currently, we cannot satisfy the demand for software across the curriculum and for in-service training courses.

What do we mean by Computer Based Learning? A working definition might be 'any learning environment which is enhanced by the use of a computer'. CBL, as it is normally called, can be either teacher or pupil driven or a combination of both. In each case, it is necessary to determine whether the introduction of a computer adds to or subtracts from the learning process. The special qualities afforded by speed, accuracy, infallible memory, manipulative capacity, interaction and endless patience can all be used to motivate but never the sheer novelty of new technology.

Let us now turn our thoughts to the curriculum itself. It is largely founded on tradition and to a great extent is controlled by the examination boards and, in turn, the universities. Shifts in curriculum emphasis are slow to take place and vested interest from established departments such as Mathematics and English does not augur well for change. Yet changes are vital if children today are going to cope with tomorrow's technology. New skills are required, particularly that of information handling. To be able to cope with a rapidly changing working environment must be a desirable attribute for all in the future. How can we use Information Technology to inculcate these new skills?

The Microelectronics Education Programme is concerned with exploiting all forms of information technology. Viewdata, teletext, telesoftware, gateway, networks, interactive video and microcomputer-based information handling packages are all playing their part in the learning process. Let us illustrate the use of an information handling package in the context of social history. Census data has been obtained and formatted for interrogation on a microcomputer, over a period of 40 years, 1841 to 1881 in 10 year spans for the village of Datchworth in Hertfordshire. Using a software package called MicroQUERY, we can use the microcomputer as a microscope on a particular year in the life of the village.

First we look at the census for 1851. The 'Shadbolt' family name is quite common in Datchworth. We ask the computer to print out all the Shadbolts.

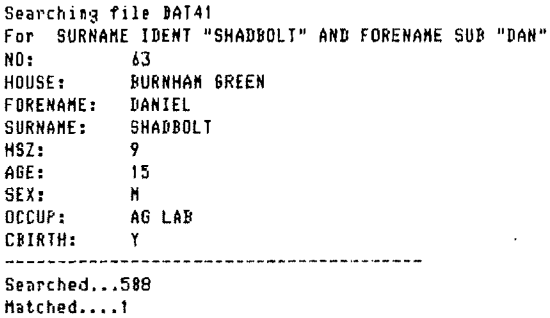
```
Searching file DAT51
For  SURNAME IDENT "SHADBOLT"
FORENAME           SURNAME      SCH  REL  AGE  OCCUP                           TBIRTH
--------           -------      ---  ---  ---  -----                           ------
PETER              SHADBOLT     39   H    24   AG LAB                          WELWYN
ANN                SHADBOLT     39   W    23                                   DIGSWELL
MARY ANN           SHADBOLT     39   D    4    SCHOLAR                         DATCHWORTH
JONOTHAN           SHADBOLT     39   S    2                                    DATCHWORTH
HARRIET ELIZA      SHADBOLT     39   D    0                                    DATCHWORTH
BENJAMIN           SHADBOLT     41   H    74   PAUPER AG LAB                   DATCHWORTH
CATHERINE          SHADBOLT     41   W    66                                   NORTH MIMMS
JAMES              SHADBOLT     52   H    34   AG LAB                          DATCHWORTH
ANN                SHADBOLT     52   W    32                                   MUCH WYMONDLEY
JAMES              SHADBOLT     52   S    12   AG LABOURER                     WELWYN
GEORGE             SHADBOLT     52   S    10   AG LABOURER                     DATCHWORTH
MARY ANN           SHADBOLT     52   D    8    SCHOLAR                         DATCHWORTH
JOHN               SHADBOLT     52   S    6    SCHOLAR                         DATCHWORTH
RBECCA             SHADBOLT     52   D    3    SCHOLAR                         DATCHWORTH
DAVID              SHADBOLT     52   S    1                                    DATCHWORTH
HARRIET            SHADBOLT     61   D    16   AT HOME                         DATCHWORTH
EMMA               SHADBOLT     61   D    10   SCHOLAR                         DATCHWORTH
WILLIAM            SHADBOLT     61   S    8    SCHOLAR                         DATCHWORTH
DANIEL             SHADBOLT     69   H    28   GROCER                          TEWIN
ALICE              SHADBOLT     69   W    28                                   DATCHWORTH
GEORGE             SHADBOLT     69   S    9    SCHOLAR                         DATCHWORTH
HENRY              SHADBOLT     69   S    8    SCHOLAR                         DATCHWORTH
PRICILLA           SHADBOLT     69   D    6    SCHOLAR                         DATCHWORTH
SUSANNAH           SHADBOLT     69   D    3                                    DATCHWORTH
DAVID              SHADBOLT     69   S    1                                    DATCHWORTH
ALFRED             SHADBOLT     69   S    0                                    DATCHWORTH
EDMUND             SHADBOLT     73   H    24   AG LAB                          TEWIN
HANNAH             SHADBOLT     73   W    22                                   BRAMFIELD
JOHN               SHADBOLT     73   S    5    SCHOLAR                         DATCHWORTH
WILLIAM            SHADBOLT     73   S    2                                    DATCHWORTH
EMMA               SHADBOLT     73   D    0                                    DATCHWORTH
CHARLES            SHADBOLT     74   H    38   CARRIER                         DATCHWORTH
HANNAH             SHADBOLT     74   W    27                                   BRAMFIELD
FANNY              SHADBOLT     74   D    6    SCHOLAR                         DATCHWORTH
JAMES              SHADBOLT     74   S    5    SCHOLAR                         DATCHWORTH
WILLIAM            SHADBOLT     74   S    3    SCHOLAR                         DATCHWORTH
GEORGE             SHADBOLT     74   S    1                                    DATCHWORTH
Searched...648
Matched....37
```

There are 7 families living in different households with the name Shadbolt. We choose Schedule 69 where Daniel and Alice live with their 6 children.

Question: Were large families common in those days?

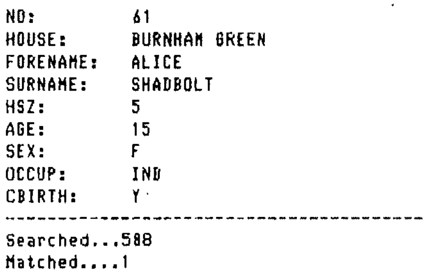
Question: Were Daniel and Alice in the village in 1841 and were they married (note that they were both 18 in 1841)?

This looks like Daniel in 1841 except that he is only 15 and was not likely to have been married as he lives in a large family of 9.



```
Searching file DAT41
For  SURNAME IDENT "SHADBOLT" AND FORENAME SUB "DAN"
NO:         63
HOUSE:      BURNHAM GREEN
FORENAME:   DANIEL
SURNAME:    SHADBOLT
HSZ:        9
AGE:        15
SEX:        M
OCCUP:      AG LAB
CBIRTH:     Y
----------------------------------------
Searched...588
Matched....1
```

What about Alice? This is the only one in the village in 1841 and her age is 15.



```
NO:         61
HOUSE:      BURNHAM GREEN
FORENAME:   ALICE
SURNAME:    SHADBOLT
HSZ:        5
AGE:        15
SEX:        F
OCCUP:      IND
CBIRTH:     Y
----------------------------------------
Searched...588
Matched....1
```

Could it be the same one? Remember the 1851 Alice was born in Datchworth so it is very likely the same one. If it is, it means that Daniel and Alice were already related before marriage, since both have surname Shadbolt.

Question: What was their relationship?

Let us look at the family in 1861. They now have 11 children. In general, the Shadbolts have expanded as a family name in the village.

```
Searching file DAT61
For  SURNAME IDENT "SHADBOLT"
FORENAME        SURNAME          SCH REL AGE OCCUP                     TBIRTH
--------        -------          --- --- --- -----                     ------
CATHERINE       SHADBOLT         5   H   77  RETIRED NURSE             NORTH MIMMS
MARY ANN        SHADBOLT         5   G   14  SERVANT                   WELWYN
HARRIET         SHADBOLT         5   O   11  SCHOLAR                   DATCHWORTH
PETER           SHADBOLT         6   H   36  AG LAB                    DATCHWORTH
ANN             SHADBOLT         6   W   34                            DIGSWELL
FREDERICK       SHADBOLT         6   S   7   SCHOLAR                   DATCHWORTH
SARAH           SHADBOLT         6   D   5   SCHOLAR                   DATCHWORTH
EMILY           SHADBOLT         6   D   4                             DATCHWORTH
WILLIAM         SHADBOLT         6   S   0                             DATCHWORTH
MARY ANN        SHADBOLT         10  X   19  HOUSE SERVANT             DATCHWORTH
JOHN            SHADBOLT         10  X   14  HOUSEKEEPER               DATCHWORTH
DANIEL          SHADBOLT         25  H   39  COSTER MONGER             WELWYN
ALICE           SHADBOLT         25  W   39                            DATCHWORTH
GEORGE          SHADBOLT         25  S   20  IDIOT                     DATCHWORTH
HENRY           SHADBOLT         25  S   18  AG LAB                    DATCHWORTH
PRICILLA        SHADBOLT         25  D   16                            DATCHWORTH
SUSAN           SHADBOLT         25  D   14  SCHOLAR                   DATCHWORTH
JULIA           SHADBOLT         25  D   9   SCHOLAR                   DATCHWORTH
DAVID           SHADBOLT         25  S   12  SCHOLAR                   DATCHWORTH
ALFRED          SHADBOLT         25  S   10  SCHOLAR                   DATCHWORTH
DANIEL          SHADBOLT         25  S   6   SCHOLAR                   DATCHWORTH
EMMA            SHADBOLT         25  D   5   SCHOLAR                   DATCHWORTH
FREDERICK       SHADBOLT         25  S   2   SCHOLAR                   DATCHWORTH
WILLIAM         SHADBOLT         25  S   0                             DATCHWORTH
CHARLES         SHADBOLT         27  H   47  AG LAB                    DATCHWORTH
HANNAH          SHADBOLT         27  W   39                            BRAMFIELD
HENRY           SHADBOLT         27  S   6   SCHOLAR                   DATCHWORTH
FANNY           SHADBOLT         27  D   17  SERVANT                   DATCHWORTH
JANE            SHADBOLT         27  D   15  SCHOLAR                   DATCHWORTH
WILLIAM         SHADBOLT         27  S   13  AG LAB                    DATCHWORTH
GEORGE          SHADBOLT         27  S   11  AG LAB                    DATCHWORTH
REBECCA         SHADBOLT         27  D   9   SCHOLAR                   DATCHWORTH
DAVID           SHADBOLT         27  S   7   SCHOLAR                   DATCHWORTH
JOHN            SHADBOLT         28  T   15  AG LAB                    DATCHWORTH
WILLIAM         SHADBOLT         28  T   12  AG LAB                    DATCHWORTH
EMMA            SHADBOLT         28  T   10  SCHOLAR                   DATCHWORTH
SARAH           SHADBOLT         28  T   7   SCHOLAR                   DATCHWORTH
EDMUND          SHADBOLT         28  T   5   SCHOLAR                   DATCHWORTH
ELLEN           SHADBOLT         28  T   3   SCHOLAR                   DATCHWORTH
HARRIET         SHADBOLT         28  T   0                             DATCHWORTH
GEORGE          SHADBOLT         44  L   20  AG LAB                    DATCHWORTH
Searched...635
Matched....41
```

Question? What is a Coster Monger?

Question: What did society mean by 'idiot'. What happened to them in those days?

In 1871, 3 more children have arrived but several have disappeared from the family house.

Question: Did any of them marry?

```
Searching file DAT71 .
For  SURNAME IDENT "SHADBOLT"
FORENAME      SURNAME      SCH REL AGE OCCUP                                 TBIRTH
--------      -------      --- --- --- -----                                 ------
WILLIAM       SHADBOLT     55  L   26  AG LAB                                DATCHWORTH
ELIZABETH     SHADBOLT     55  L   22  AG LABS WIFE                          WELWYN
CHARLES       SHADBOLT     61  H   59  AG LAB                                DATCHWORTH
HANNAH        SHADBOLT     61  W   47  AG LABS WIFE                          BRAMFIELD
JANE          SHADBOLT     61  D   25                                        DATCHWORTH
SARAH A       SHADBOLT     61  D   17                                        LEE
JOHN          SHADBOLT     61  S   8   SCHOLAR                               DATCHWORTH
MARGARET      SHADBOLT     61  D   2                                         DATCHWORTH
HENRY         SHADBOLT     64  H   39  PUBLICAN                              TEWIN
REBECCA       SHADBOLT     64  W   29  PUBLICANS WIFE                        DATCHWORTH
JOSEPH        SHADBOLT     64  S   5   SCHOLAR                               TEWIN
MARY J        SHADBOLT     64  D   3   SCHOLAR                               TEWIN
HARRIET E     SHADBOLT     64  D   0                                         TEWIN
ALFRED        SHADBOLT     64  L   20  AG LAB                                DATCHWORTH
DANIEL        SHADBOLT     69  H   45  HIGGLER                               TEWIN
ALICE         SHADBOLT     69  W   46  HIGGLERS WIFE                         DATCHWORTH
JULIA         SHADBOLT     69  D   18  SERV                                  DATCHWORTH
EMMA          SHADBOLT     69  D   12  SCHOLAR                               DATCHWORTH
DANIEL        SHADBOLT     69  S   17  HIGGLER                               DATCHWORTH
FREDERICK     SHADBOLT     69  S   10  SCHOLAR                               DATCHWORTH
ROSA          SHADBOLT     69  D   7   SCHOLAR                               DATCHWORTH
THOMAS        SHADBOLT     69  S   4   SCHOLAR                               DATCHWORTH
JOSEPH        SHADBOLT     69  S   3   SCHOLAR                               DATCHWORTH
Searched...606
Matched....23
```

Son lodging with relations

Question: What is a higgler?

In 1881, Daniel and Alice are still together but with a much smaller family.

```
Searching file DAT81
For  SURNAME IDENT "SHADBOLT"
FORENAME     SURNAME      SCH REL AGE OCCUP                             TBIRTH
--------     -------      --- --- --- -----                             ------
DAVID        SHADBOLT     78  H   28  FARM LABOURER                     HERTFORD
EMMA         SHADBOLT     78  W   33                                    DIGSWELL
JOHN         SHADBOLT     78  S   0                                     DATCHWORTH
DANIEL       SHADBOLT     82  H   57  GENERAL DEALER                    DATCHWORTH
ALICE        SHADBOLT     82  W   57                                    DATCHWORTH
FREDERICK    SHADBOLT     82  S   23  FARM LABOURER                     DATCHWORTH
WILLIAM      SHADBOLT     82  S   21  COAL CARTER                       DATCHWORTH
ROSA         SHADBOLT     82  D   19                                    DATCHWORTH
```

```
THOMAS      SHADBOLT  82  S  17  FARM LABOURER                  DATCHWORTH
JOSEPH      SHADBOLT  82  S  12  SCHOLAR                        DATCHWORTH
SOLOMON J   SHADBOLT  85  S  16  FARM BOY                       TEWIN
MARY J      SHADBOLT  85  D  13  SCHOLAR                        TEWIN
HARRIET E   SHADBOLT  85  D  10  SCHOLAR                        TEWIN
ALFRED      SHADBOLT  89  V  30  WOODMAN ← Son visiting         DATCHWDRTH
CHARLES     SHADBOLT  92  H  62  WOODMAN                        WELWYN
HANNAH      SHADBOLT  92  W  58  HIGGLER.                       BRAMFIELD
JANE        SHADBOLT  92  D  35                                 DATCHWORTH
JOHN        SHADBOLT  92  S  18  FARM LABOURER                  DATCHWORTH
MARGARET    SHADBOLT  92  D  12  SCHOLAR                        DATCHWORTH
REBECCA     SHADBOLT  92  G  9   SCHOLAR                        DATCHWORTH
HENRY       SHADBOLT  99  H  -1  FARM LABOURER ← Son now Married DATCHWORTH
REBECCA     SHADBOLT  99  W  34                                 DATCHWORTH
HARRIET E   SHADBOLT  99  D  14                                 DATCHWORTH
EDWARD      SHADBOLT  99  S  11  SCHOLAR                        PENGE
JULIA       SHADBOLT  99  D  7   SCHOLAR                        PENGE
JANE        SHADBOLT  99  D  4   SCHOLAR                        PENGE
WILLIAM     SHADBOLT  99  S  2                                  DATCHWORTH
WILLIAM     SHADBOLT  100 H  33  FARM LABOURER                  DATCHWCRTH
BETSY       SHADBOLT  100 W  31                                 WARE
HANNAH      SHADBOLT  100 D  9   SCHOLAR                        DATCHWORTH
ELIZABETH   SHADBOLT  100 D  7   SCHOLAR                        BIRMINGHAM
CHARLES     SHADBOLT  100 S  5   SCHOLAR                        HALIFAX
MARY E      SHADBOLT  100 D  1                                  TEWIN
Searched...628
Matched....33
```

Question: Is there sufficient data to compose a family tree for Daniel's branch of the Shadbolt family?

Hey wait a minute! Henry (Daniel's son) is married to Rebecca and they had three children in Penge. Henry was not in Datchworth in 1871. That explains his absence from the records. I wonder if . . .

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Discussion

SESSION TWO

The following points were made during the discussion:

1. With regard to one aspect of the introduction of word processors: when scattered through offices among secretaries and typists the majority found they were very acceptable, but when concentrated in typing pools the greater efficiency of the machines restricted the social interaction necessary for a harmonious office environment.
2. There was general support for word processors when easing the burden of the endless redrafting of texts, so much a part of typist lives.
3. With regard to the medical and physical problems associated with the word processor: the Employment Medical Advisory Service of the HSE is constantly working on these problems. A report by Colin McKay is available through HMSO and there are many bibliographic references on HSELINE available through ESA-IRS. The proceedings of a conference on health hazards of VDU's are available from HUSAT Research Group, Department of Human Sciences, Loughborough University of Technology, Loughborough, Leics.

It was also suggested that the harmful effects from word processors are mostly associated with movement on the screen i.e. frequency, speed and quantity of data displayed at each change. This was especially true for green displays. It is hoped that the amber display screen, now accepted by Europe, may help with this problem.

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International Specialist Course

New Information Technology in Libraries

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The impact of information technology is already transforming library and information services and this is a process which can confidently be expected to continue. The course is intended to provide qualified and experienced library and information workers with an intensive theoretical and practical introduction both to the principles underlying the new technology, and to its present and future application in the provision of library and information services.

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The course will be presented by a team from the University of Sheffield Department of Information Studies (formerly the Postgraduate School of Librarianship and Information Science). This department has pioneered teaching and research in the United Kingdom in many aspects of information technology, and its first Director, **Professor W L Saunders CBE**, and **Professor M F Lynch**, who holds a Personal Chair in Information Science, will be joint directors.

The major part of the programme will be held in the Department of Information Studies of the University of Sheffield, but during the last few days London will be used as an additional base for visits to carefully chosen organisations to see a wide range of current practice and research developments.

Qualifications of members

Members should be professionally qualified library or information workers with an interest in information technology and its applications, and preferably with a reasonable expectation of being able to apply knowledge gained on the course. Preference will be given to those with a basic understanding of computers; however, a knowledge of programming will not be required. A preliminary reading list will be provided.

There are vacancies for 30 members.

Fee £990 (Residential), £575 (Non-residential)

Residential course members will be accommodated at Halifax Hall, part of the University of Sheffield.

Further information and application forms for this, and other British Council specialist courses, can be obtained from your local British Council office or from the Director, Courses Department, The British Council, 65 Davies Street, London W1Y 2AA.

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Educating Library Users

3 - 15 July 1983 in Sheffield

It is now generally recognised by both librarians and educators that instruction of library users is necessary if libraries are to be used effectively. Programmes of library user education are therefore becoming common in most types of library. The aim of the course is to consider the reasons for educating library users, the problems of establishing and running user education programmes and to examine possible solutions. The problems presented by different disciplines and the different types of library will be discussed.

The course will include seminars, practical workshops, exhibitions and visits to libraries. The seminars will provide the participants with the opportunity to contribute from their own experience.

The course will be directed by **Colin Harris**, Director of the Centre for Research on User Studies at the University of Sheffield, whose previous experience includes work with the Travelling Workshops Experiment, a major research and development project in user education. He is the author of several papers on various aspects of user education and joint author of a range of teaching kits for user education.

Qualifications of members

Members of the course should preferably be practising librarians in senior or middle management, with responsibility for, or an interest in, the provision of user education for library users.

There are vacancies for 30 members.

Fee £545 (Residential), £320 (Non-residential)

Residential course members will be accommodated in a hall of residence of the University of Sheffield.

The Third International Conference on User Education will take place at the University of Edinburgh between 19 and 22 July 1983.

Further information and application forms for this, and other British Council specialist courses, can be obtained from your local British Council office or from the Director, Courses Department, The British Council, 65 Davies Street, London W1Y 2AA.

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British Telecom and the communications industry after Beesley

F. Lawson
British Telecom

A talk given at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

IT HAS BEEN SAID recently that British Telecom, its customers and a very important part of British industry, the telecommunications industry, are undergoing a revolution in their mode of operation. We've already had the first part of that revolution and there has been an attempt to compress into a period of roughly two and a half years what has taken in the United States something like thirteen to fifteen years. The second stage of that revolution was promised for later in 1982 if, as has been suggested, there is to be a further Telecommunications Bill introduced, and then, subject to the views of the electorate, there will be an even more fundamental change promised for the end of 1983/84 which will give a total conversion of British Telecom from a public corporation into a Company's Act type of company. So, talking today about the future is very difficult, and I am reminded of the Greek farmer, Agememnon, who, when he had planted his crop, went to the local soothsayer—we were then in a very primitive stage of information technology—and said 'Well, I planted my crop, what's going to happen?' And the local soothsayer, using the technology he had at the time, cast his runes, looked into the entrails, and so on, and said 'I will give you a definite forecast. Providing that you have used the right seed, you have planted it at the right depth, provided the soil is of good quality, provided that the amount of rain is just enough and not too much, provided that the wind gently bows the ripening corn rather than flattens it', he said, 'you will have a good harvest'. And then, I think, with all the temerity of people who control information, he realised he'd gone too far out on a limb and he said, 'But above all beware of the locusts.' And in talking about the future, British Telecom, the telecoms industry and our customers, I'm very conscious at the moment of the locusts who are floating around our heads daily and it's sometimes difficult to sleep for the noise of the buzzing.

But, how did it all begin? It began as increasingly these revolutions begin, with an Act of Parliament. At one time, we had a basic Telecommunications Act roughly once every 98 years. This had considerable advantage because it meant that you had a period of stability. It meant, also, that when you came to the next Act, there was not a great deal of expertise around that remembered the drafting of the previous one and you had a number of

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derived judgements in the interval. So, for example, over 98 years we have learned of interpretations suggesting that when the draftsmen of the 1869 Telegraph Act were talking about telegram lines and telegraph apparatus; what they meant was this new thing where you spoke into a mouth-piece and it went along a different type of line, the telephone, and they had in their minds that at one time you would send bits of information along a line instead of speech, they'd foreseen data, and they'd also foreseen the development of radio and television. So, you read what they said in 1869, in the knowledge that they'd seen what was going to happen during the next 98 years. And this was, in many ways, very convenient. But the frequency of basic telecommunication Acts has now changed, we had one in 1980 which came into effect in 1981. We are now promised a second one this year coming into effect perhaps in another year's time. The basic intent of the 1981 Act was that it would remove the monopoly powers, which I've mentioned, which the old Post Office, and then British Telecom, had enjoyed for a period of nearly a hundred years. Standards had been decided by the Post Office, equipment had been marketed by the Post Office in whatever form it decided at whatever time and at whatever tariffs, equipment was connected to the network only if the Post Office allowed it to be attached, and there was, therefore, a substantial monopoly. This monopoly was a benevolent one. I can say this dispassionately, having been concerned with its operation for some years! It was applied benevolently and, for example, there were, as attachments to our networks, over ten thousand types of privately supplied equipment. This was much more than in any other European country and a number of our European colleagues, in fact, suggested that we had been too liberal in this respect. We were getting twelve hundred new items every year, and we were getting fundamentally new equipment which could be privately supplied, but it was dependent upon a decision of a monopoly whether it was to happen or not. So, the purpose of the 1981 Act was to remove from B.T. a number of the privileges which we'd had. The standards would no longer be written by British Telecom and decided arbitrarily by British Telecom. They would be written by a new body on behalf of the Secretary of State and this is the British Standards Institution. The approval of equipment would no longer be done by British Telecom; it would be done by a new body which originally was going to be the British Electro Technical Approvals Board, but later became a company, BABT, which is a subsidiary of that Board. And also, that instead of British Telecom supplying virtually all the basic equipment, almost the whole of this equipment would be open to private supply. There would be an exception with the first telephone on a direct exchange line, there would be an exception with the maintenance of some of the types of private automatic branch exchanges, but generally the whole thing would open up. And it would be a revolution and it was meant to be a revolution in a very short time.

I think at the beginning there was some sort of under-assessment of what was involved in this. I think there was a feeling that, as far as standards were concerned, there would be a simple sort of surrender ceremony in which we would go over a bookcase file and hand over 100 volumes of standards and transfer them to the British Standards Institution. But, of course, these standards had not been written as we had been supplying all of the basic equipment, procuring it from suppliers, not only in this country but throughout Europe and other parts of the world. There were no standards as such, there were only tender documents for equipment. So, the British Standards Institution had to start on this gargantuan task of writing standards for a lot of types of attachment with the prospect that under liberalisation, there could be several times more that number of attachments and they had to write the standards for basic equipment such as telephones, private automatic branch exchanges, and not only equipment which was already there, but equipment which, with the development of information technology, would be flooding onto the market. The British Standards Institution has been doing this for a year, and the first standards are now nearing approval. It has proved to be a very difficult task. We ourselves have co-operated in this, we have supplied experts on something like twenty five working groups of the British Standards Institution, and this has been matched by roughly twenty other organisations, and we should get the first four or five of these standards shortly, and this is the beginning of a very large task.

When it comes to actually approving equipment, to approve twelve hundred types of anything, each year, is a task involving considerable problems of logistics and resources, and when this is interactive telecommunications equipment and when it has a new technical base which couldn't have been foreseen in many cases, even by experts, and when that equipment is being under wraps by manufacturers throughout the world so that it didn't leak out that they were innovating, then one can see the problem facing someone who has to test twelve hundred types of this equipment every year. The British Approvals Board for telecommunications was not staffed initially to do this, did not have the resources, and British Telecom, contrary to the impression given in some parts of the Press, has helped it to come about by providing its own laboratories, by modernising them and offering to do this on an agency basis for the independent body. We don't want to do this, there is no possible merit in being judge and jury because the prisoner in the dock is never convinced that you are not moving to one side or the other. This is simply an attempt to get an independent approval system working earlier than it would have done. We also thought that if people had to wait a year, eighteen months or two years for the first stages of liberalisation, there would be a feeling, which again has been echoed in some parts of the Press, that we in British Telecom were deliberately playing the game long and trying to protect our monopoly. So, during the last year we've taken a number of initiatives which have brought private equipment onto the market much earlier than it would have done under the Government's programme.

The basic problem was with telephones, where you had in some shops a number of fun phones, etc., which couldn't at the time be approved for attachment to our network because there was no machinery for doing this—the new machinery, as I've said, had to be set up. So, what we did was to help our competitors by saying if you do want competitive telephones on the market ahead of the government programme, the Department of Industry should carry out a trawl of telephones, submit to us a number of these, we would test them in our laboratories, keeping them quite separate from our commercial developments, and approve them as competitive telephones. And, in fact, we did this and the first ones have been placed on the market recently. I think this is an unusual and very odd practice of a monopolist helping its competitors ahead of the game. But again, this was thought to be too few, you're only talking about half a dozen, eight, nine, ten of these telephones, so, as a further act of liberalisation, we decided in principle to free a range of our own telephones and telex machines to allow these to be privately supplied. They included some of our special range telephones and some of our basic telephones. In a further initiative, we tackled the problem of cordless telephones. There is a problem with cordless telephones because there are government regulations about frequencies, etc. There are a number being used but they can only be used within very small limits and subject to a number of conditions. But I think cordless telephones are an interesting example of new technology, so British Telecom co-operated in writing an interim standard which will allow cordless telephones to be provided, not only by British Telecom, but also by our competitors, and in a separate laboratory, safeguarded from our own commercial developments, we will be testing competitors cordless telephones so that they can get on to the market. But the more liberal you are in this way, of course, the more you promote a counter-argument that if you are being as liberal as that, you must be doing it for devious reasons and you could probably be even more liberal if you tried. So, there's now pressure ahead of the game to approve some of the smaller call routing systems, and some of the private automatic branch exchanges to allow private supply of these. And a couple of months ago, we allowed, ahead of the time-table, the private supply of some teleprinters. So, if that's British Telecom dragging its feet in a subtle and clever way, it's so subtle and clever that at the moment I don't see what it is!

We have been helping to bring about liberalisation. And I think liberalisation for your industry, for the information industry, will have a major impact. First, you will have a much greater freedom in the supply, installation and maintenance of terminal equipment. And I think one of the most interesting developments, on which I spent most of last week, was the development of what we call value added network services. Here British Telecom, from the first of October 1981, said that it would start licensing a much bigger range of value added network services. These are services which take the basic functions of the network and private circuits and provide specialised services alongside these. We licensed a number of them. The Department of Industry, on the first of April, thinking that it was unusual that we should be licensing them in this way, took over the task of licensing. There have been no more licences since then, but a General Licence is being prepared which should bring about a lot more of these services and many of them will operate in the information technology field. In this information technology field, I like to think that we did do some pioneering work. I appeared before the Annan committee and talked at that time about what we called viewdata which we now call Prestel. We talked about the revolution which this would bring about in telematics, the combination of telecommunications, computer technology and broadcasting. We went into Prestel in a deliberately innovative way, ahead of development of the market. It was one of the first attempts to stimulate a market rather than wait for the market to make itself known. We've also moved into the value added field ourselves with British Telecom Dialcom, an electronic mail service which offers a comprehensive range of automated office bureau services. It converses with you, you'll be glad to know, in the familiar English terms and using step-by-step easy-to-follow prompts. You can have mail delivered read at any time and you can use a wide range of terminals linked to different services. Dialcom offers an extensive range of inter-related facilities and services all designed to help in the sending, receiving, handling and filing of information.

On the liberalisation and the development of some of the equipment, one of the areas where there will be innovative technology is in private automatic branch exchanges. Because British Telecom, the old Post Office, had supplied most of these in the past, there was a range largely of electro-mechanical PABXs which were coming to the end of their technological life. So, we have been trying to widen the range of PABXs available to customers. PABXs above a hundred lines has been, open to private supply for some years, and we had over the years approved a wide variety of these large PABXs. But again as an additional task requiring additional resources, we offered to carry out a further trawl throughout the world of equipment available, and offered to approve another batch of modern large PABXs. We are currently doing that and I think we have there a mix of some really innovative equipment. We had some thirty companies worldwide which tendered and we selected six of these in order to test them, approve them and have them developed for the market. We only could do six and not the thirty because one problem for us at the moment is that we are the only body with the resources in terms of staff, laboratories and standards, to actually carry out the evaluation of this equipment which will enter a liberalised market. It is an odd position to be in, it's a difficult position to be in, but we are having to ration the resources so that we can have liberalisation earlier on about six or seven different fronts instead of concentrating all on one. Moreover these modern PABXs are in the latest technology involving digital SPC, high speed integrated voice and data etc., so there will be an increasing range of products available.

One of the basic problems which faced us in going into a liberalised market was that we had to develop our own sales force and our own sales techniques. We had a large field sales force but many of those had operated for much of their career in an environment where we were short of capital where we had erratic supplies of equipment, where we had a monopoly of supply and they hadn't had to operate in the full commercial mode. Now, many of them had wanted to operate in this mode, it wasn't that they were recruited because they didn't have the capacity to do this. We had not given them the opportunity of operating in a commercial mode and when we did give them that opportunity, they did in fact, operate very well. But it was necessary to widen our field sales force and we carried out a major recruitment exercise bringing in people from outside. We divided industry and business into sectors and particular groups and had specialist field sales forces to deal with those sectors. We've now recruited major account managers who service the largest customers and we have marketing service representatives who look after small businesses in a specialised way. They are now out in the field, and we're beginning to get the first impact from them, and they will, from now on, of course, be competing with the salesman of private suppliers.

But however good salesmen you've got, they've got to have the products, and, as I've mentioned, we did have this problem with some of our basic products that they had been around for a long time. They were also basically electro-mechanical technology. So we started by modernising the private automatic branch exchange field. We introduced the Monarch call connect system, which has already proved a winner with those businesses needing a medium sized PABX with modern facilities. It is processor controlled capable of providing integrated voice and data communications and we are currently developing high speed direct digital interfaces. There will be a bigger range of sizes of the Monarch and there'll also be an increase in the features and the facilities and the software which is available for some specialised users. Alongside of this we introduced the Regent which is another modern private automatic branch exchange available in some parts of the country. It offers a wide range of facilities and is aimed at businesses requiring a range of extensions. And then for the smaller business market, we introduced Herald. This is a highly adaptable system suitable for many business users. It is processor-controlled, meeting our customer demands for flexibility and you can vary the number of lines and extensions, depending on your needs. So the system grows in conformity with the growth of your business. You don't have to decide on a pre-arranged module as you had to with the older PABXs and anticipate what size you would reach.

But PABXs and ordinary exchange lines require a variety of telephones, and one of our problems again, which had led to the development of the illicit telephones in telephone shops, was that we had a limited range of telephones. So, in the same way we've modernised the private automatic branch exchange system again we are modernising telephones. There'll be modern, exciting new designs, and they will incorporate the latest in modern technology. The first of the new range is called Ambassador and these are available throughout the country and are selling well. Not only is it ideal for ordinary use but it's ideal for the new Monarch and Regent call connect systems which I've been talking about. For business use, we've introduced the Ambassador electronic switching system, which is capable of serving customers with one or two lines and up to four extensions. It's easily installed, provides inter-office as well as an external call facility. In fact, one of the features of all of the equipment in this field is the ease of installation. You no longer have to dig out a basement in order to install a large processor, you can in fact put it in a small area behind the operator, operating at a desk, the consoles are small, the equipment through which they work is again very compact. A range in which we didn't have a very wide variety of requirements available to supply to our customers was in the call maker range. We're introducing throughout this year a wide range of new call makers, the Tyne, Trent and Medway. We tend to go in cycles of mountains, rivers, parts of the aristocracy and so on, and for call makers at the moment we're on rivers. So we have the Tyne, Trent and Medway which vary between 50 and 200 number call makers and then they have clock, date display etc.

The answering and recording machine industry is an interesting example of what liberalisation and liberalisation ahead of the government pressure to liberalise can do. In the early days, answering machines could only be rented, they couldn't be sold outright. There were in fact good reasons for this in earlier days, because you had constant changes within the switching network and some of these outmoded certain answering machines and the idea was that if you rented them, then your supplier would have to make the adaptations and the customer wouldn't have obsolete equipment. But this became increasingly unlikely because the switching systems are capable of much more sophistication now so again, ahead of government pressure, we allowed the direct sale of answering machines and instead of having only a handful of high value, high quality answering machines available for industry, you now have a range from the simple one which is available and can be used in your home, through a medium range for small business, right up to the elaborate and sophisticated ones. And we are introducing several of these and here we are now in the bird sort of syndrome, we are calling them Eagle, Falcon and Hawk, with different types of facility. It's very interesting in marketing how you choose names, and if you're bringing out lots of items, as we are at the moment, it's very difficult to find a consistent range of names for them. If you call them, as we did with one of our products at the beginning, the CDSS 1, this loses a lot of its immediate sales appeal and impact to the average customer. So you've got to get the right sort of name.

With telephones we have already departed from the standard sort of range. The Sceptre was one developed in our own research laboratories and produced for us very quickly indeed. It was available for the first time earlier this year, it's a micro-processor controlled press-button telephone with a range of facilities, storage, repeat last number display of number being dialled, display of stored numbers, and what the brochure says is real time clock display. I would have thought if you did display the time and it wasn't real, it would lose a lot of its advantage! This telephone is available in two tone colour combinations and is available throughout the country.

Now, increasingly, a lot of us travel around a lot as we are today, and a lot of us are on the move in the course of the day from meeting to meeting. One of the services which got a very bad image, a Cinderella image, and, in fact, worse than Cinderella because she was loved and you couldn't say that of this particular service, was our public call box service. We'd had the problem of vandalism, we'd had the problem of some of these boxes being used for purposes for which they were not originally designed. And we had equipment in them which was 25 years or so old. It was good equipment, it served quite well, but when you are at a railway station hammering coins continuously into a box and when you are abusing them as you see the train leave or you've heard the announcement that British Rail regret very much the delay, then some of these boxes are bound to be out of order. And they were only found to be out of order when sufficient people were furious or when our staff came round on the next inspection. So we've replaced these and some of you will have seen the new blue pay phone, which is becoming quite widespread throughout the country. We have placed orders for substantially more of these and they will become a very common sight. Because of the problems of inserting coins into the boxes, having to clear them, having to count them, having to account for them, we decided to try out as an experiment, in the new information technology, the card phone, where instead of using a coin, you use a card with a predetermined number of units. We didn't know whether these would work because they were on the limits of technology, we warned about that at the time. We didn't know whether in view of the fact it's taken us a long time to persuade customers to buy a book of stamps, whether we could persuade customers to buy a £2 or £10 card to use. In fact, customers have taken to them very well and you see the satisfied small queue of people outside the card phones at railway stations, compared with the larger dissatisfied queue beyond the old ones, and we're installing a lot more of those card phones. And then because you need a certain amount of space and a certain amount of facilities to install that sort of thing we have again innovated, with a small table top pay phone which can be used in boutiques, bars or even in the home for your children's use. And what you can do here is by turning a key you can use it as an ordinary telephone when you're using it and by turning the key your children are obliged to put money in it and you get a percentage of the take-off. Now doesn't that show parenthood does have some sort of benefit! The first hundred or so of those are being tried out in London, and they're going very well; we're also trying some of them out in University complexes.

So you have the sales staff, you have the products but one of the problems with the older type of equipment is the effort in actually installing it. You need this highly trained technician who has to come when you're in and when it's convenient for him in his work programme to actually hard wire all of this equipment. So we launched last year a new programme on plugs and sockets. The idea here was that the privately supplied equipment, as it became liberalised, and also the British Telecom equipment, would have a simple plug on the end of it. That would be a standard plug, it would be available to everybody who had the approved equipment. And then you would have a socket into which that fitted. Now the advantages are you could have a number of sockets and only one basic telephone and move around with it. Alternatively when you had your first telephone put in, you could have one or more additional sockets. So we are progressively, with new equipment being put in, with extension telephones being ordered from us or from the private sector, going over to this plug and socket conversion. I think all customers I've come across so far are very satisfied with that.

I mentioned the shops, one of our problems is that our General Telephone Managers Telephone Offices, such as here, are not in the main shopping centres. They were chosen for quite a different purpose, and they're away from the main shopping centres. So we wanted to have high street presences. We could have gone in for the gas showroom type in the High Street but it occurred to me at the time, a feeling which has since been reinforced, that this would not be quick enough or appropriate. So what we did instead was to negotiate on a local basis with stores like Debenhams, and Lewis's, though those are just two and it's any sort of local shop, where we hire some of their counter space and move in a module according to the size of that counter space and display our equipment. Moreover for the first time instead of renting that equipment, we sold outright. We have about twenty of those shops at the moment.

We have recently introduced a new automatic car phone service. We have had the old operator one for some time, but this is a modern automatic radio phone service and it enables our customers to make calls to 28 million phones in this country and a further 425 million telephones in more than 100 countries. It's been progressively extended beyond London.

Many customers rely on private circuits and we had had a major problem at one time because of some industrial action which we had although it isn't fair to blame this for it; it's been a problem for many years. To achieve speedy provision of private circuits, we introduced in London an overlay system of private circuits which is digital, capable of carrying a speech data, text and pictures, via a system of underground cables and microwave radio beams. This has been in operation for some time, and is being progressively extended. Because of the needs of information technology which were mentioned by the previous speaker, we announced the introduction of a wide range of services which in our typical marketing way, we've called the 'X-stream' services. We call them X-stream because international standards quite often begin with the digit X 23, 24, 25 etc., and we introduced a variety of these. They have very good marketing names, they're very good products. But for the majority of our customers, what they depend on is the basic network. That network was designed some years ago without full knowledge of everything which would happen over the next 50–100 years and this shows a deficiency on the part of the planners. So we are now having to modernise our network and our switching system and here again we are going in with System X which will offer a much improved system generally for people, more reliable, better quality transmission, etc., and will also provide a variety of special services on it which overcome the constraints of the existing network. But of course when you're not starting from scratch, a replacement of this kind is bound to take some time. But with System X we have for the first time deliberately planned the choice of the replacement units on the basis of market demand. For example, when we introduced subscriber trunk dialling we did this on the basis of exchanges which became ready for replacement, so some of the earliest ones were in places like Bournemouth where you didn't get as good a mix of business as you would have done in some others. But now we are selecting in fact the business centres. An exciting development which I'll touch on, is optical fibres. You've all heard a spokesman talking about the recabling of the country which he says is not in order to provide wall-to-wall 'Dallas,' and it seems to me as a marketing man you never give away something like that, in case one sector of your customers is looking forward to wall-to-wall 'Dallas'! It will in fact provide a very wide range of facilities in the home. And the key to this is in fact the development of optical fibres. We have been using these for some time, and we've placed major orders for it. In Milton Keynes we have one of the most advanced cable television systems and a small number of houses are being linked up by optic fibre to test the full range of facilities available.

I hope that I have been able to give you some idea of how British Telecom is trying to face the future, how it has already undergone a certain amount of change—not enough yet, but it has begun to change—and how we are determined that that change will benefit not only us, but also our competitors by expanding markets, and our customers, by giving them a wide range of facilities. We and the telecommunications industry are going to have to adapt to very sudden change and variety of requirements.

Information and satellite technology

R. Morris

British Aerospace

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982.

I SHALL DIVIDE my paper into three parts:

First — a brief review of what a satellite is
Second — a review of the development of communications satellite technology
Finally — how that technology is being and will be used in information technology as a whole, but with particular reference to the dissemination of the stored information—which I take to be the mission of those concerned with library science.

What is a satellite?

An artificial satellite is a spacecraft which is launched into space with sufficient velocity for it to escape from the earth's atmosphere, but not sufficient for it to be out of the pull of the earth's gravitational field. So it performs an elliptical orbit round the earth. A special case of the ellipse, is, of course, the circle, and when that circle is concentric with the equator, then the satellite is said to be in equatorial orbit, and if its speed is correct, then the satellite will move round the centre of the earth at the same angular velocity as the point on the equator directly below it. Thus, to an observer on the earth the satellite will appear stationary. The orbit, which is called the geostationary orbit, is about 36,000 km in radius, so that around the equator we now have over 50 satellites which can be used for communication purposes.

How can such a satellite be used for communications?

Of course we could send signals up to it, and try to detect the reflections, but that would be extraordinarily difficult. Still, the very first communication satellites did just this, but it soon became possible to use the sun's energy, of which there is a plentiful supply in space, to power an electronic device, known as a transponder, which collects the tiny signals from earth stations, and re-transmits them after amplification by a Travelling Wave Tube, with greatly increased powers.

So the typical satellite of the 1970's such as Intelsat III had a blanket of solar cells on the body of the spacecraft which was kept spinning to stabilise

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the spacecraft, and a simple horn antenna which was kept facing the earth, by a motor running in the opposite direction to the spin, and covered all the visible portion of the earth's surface with radiation from its transponders.

Slightly more efficiency was achieved by having a large dish antenna, as on this maritime satellite, which gives a pattern like this. Now that is fine for ships, but does not provide a great deal of power to any particular ship, so that it can only handle 30 to 50 telephone conversations at once, and of course, a great deal of the power is wasted because it is spilling over land. The converse would be the case if we wanted to communicate between land masses—a large spreading 'footprint' would waste a lot of power over the sea.

So, a change of design was necessary, a design which provided a stable platform on which a number of small antennas could be mounted, such as OTS, the Orbital Test Satellite which was launched in 1978. This satellite is called a 'three-axis stabilised' satellite, because its body is stabilised by momentum wheels, and instead of the whole body being covered with solar cells, the cells are carried on panels which rotate once every 24 hours, and follow the sun. Such a satellite can produce a number of spot beams, of different powers at their edges. Since the travelling wave tubes which supply the power are all the same—in this case 20 watts—then the bigger the spot beam, the more the power is spread over the earth's surface, and the bigger the ground station dish you will need to transmit and receive a certain volume of information in a given time.

For example, in the biggest of these beams, a television signal can be transmitted, with multilingual commentary channels which occupies the whole of the 40MHz bandwidth of the channel and needs stations of 19 metre diameter, such as that at Goonhilly, to transmit and receive such signals. On the other hand, the central spot beam, which can accommodate an overall bandwidth of 120 MHz, is capable of carrying 140Mb/s of traffic between such large stations—several thousand equivalent telephone speech channels in all. It can also be used with small 3m earth stations, both for reception and transmission, so that information can be simultaneously transmitted from one point for reception throughout the area covered by the central spot beam. Hundreds, or even thousands, of stations could receive such simultaneous transmissions. I shall return later to describe some of the test programmes which have been carried out with this satellite.

Further development of spot beams will be achieved with the ECS satellite, due for launch early next year. This has one large spot beam, for television distribution, and three smaller spot beams covering various areas of Europe and the Atlantic islands of the Canaries and Azores. Each spot beam has one or more transponders allocated to it, making a total of nine in all.

In addition there will be two special transponders, specially designed for use with small–5 m earth stations which will cover all the capitals of Western Europe.

In the second half of the decade, we shall see even higher power satellites in use in Europe. The giant L-Sat which is due for launch in 1986, will be collecting enough power from the sun to generate 3.5 Kw of DC power, even at the end of life, and, among other services, will be generating sufficient Radio Frequency power from its 200 watt travelling wave tubes to enable television signals to be received over a whole country—for example Italy, on a 90cm dish which can be coupled up to a home television set.

The influence of direct broadcast television from satellites on library science is, of course, rather unpredictable—but large satellites of the L-Sat type will be equally capable of handling signals from small earth stations, and with much large capacity, will be able to make the systems which have been the subject of development testing with OTS, into operational systems.

Television

Using the small earth station which I previously mentioned, and the central spot beam of OTS, the first test television distribution transmissions were carried out just four years ago, when we were able to receive signals at Farnborough from ITV studios in Plymouth, via the Goonhilly earth station, and from Rome, via the Fucino earth station in Italy.

This year the Eurikon project has already demonstrated the possibility of putting together a two-hour European TV programme, and transmitting it on seven successive nights, for reception at many stations in Europe, and cable operators in several European and North African countries regularly take TV programmes sent to them via OTS.

The first reception tests were quickly followed by transmission tests from a small earth station developed by the IBA, which has revolutionised the outside Broadcast business, providing transmission back to the UK from such places as the Channel Islands, oil rigs, and other remote locations, where terrestrial microwave links are difficult or impossible to implement. This operation has now become so routine for the IBA that their use of this terminal to collect TV pictures from the various World Cup venues in Spain went quite unnoticed in the Press.

Video conferencing

From transmissions for outside broadcasts and multi-point reception of television signals it was but a short step to the idea of putting the transmit and receive stations together and using them for a video conference. This we did for the first time three years ago, with two three-metre stations at the Telecom exhibition in Geneva, going through OTS and down to Goonhilly, where the 19 metre earth station was used to transmit and receive signals which were then fed over Microwave to the British Telecom Video Conference Studios at Euston Road in London. This was a highly successful exercise. We transmitted graphics as well as peoples faces, in full colour, and I had the pleasure of interviewing Arthur C. Clarke in Geneva, who displayed to me, at Euston, a copy of his famous paper, in the *Wireless World,* in which he described the use of the geostationary orbit.

Such elaborate arrangements are however, difficult to execute, and expensive to run. Moreover, business executives would rather take an overseas trip for a meeting than go to a city centre to use a video conference studio.

At this year's Farnborough show, McMichael were showing a much more modest arrangement, confined to black and white television, and with certain limitations on the graphics side—slow scan television instead of normal 625 line. But the whole set-up could be installed in a 10ft square office, and coupled to a 3 metre earth station. Such a set-up would be entirely possible to install at any factory site—given the appropriate space segment. This development is being undertaken with the British Telecom Research Laboratories at Martlesham, under an EEC COST project, COST 211. It is my belief that this is the breakthrough that we need to get video conferencing going—using the special services transponders of ECS which I mentioned earlier.

Data transmission. Stella, Spine, Project Universe, and with special interest in this form, Project Apollo. Stella is a data experiment, using 3 metre earth stations, deployed at various Atomic Energy Research Establishments in various parts of Europe, and designed to transmit data at 1 Mb/s over OTS to experimenters in one country, whose data is being generated at one or other of the large atomic research centres in another—for example CERN. Such is the speed of response that experimenters in Italy have been able to change the parameters of an experiment running at CERN, almost in real time.

Information technology applications

With Spine, we at last come a bit closer to library science. Because this experimental system includes a small terminal at the ESA Space Research Information Centre at Frascati, which has for a long time been in the forefront of information retrieval in Europe and has pioneered the Euronet terrestrial system for this purpose. Quite a lot of work has been done on this programme already, but its main purpose will be to make available Earth and Sea resource data collected at Kiruna in Sweden, as well as that stored at Frascati and Farnborough, without having to wait for it to come by mail. Indeed the Kiruna data will be coming down from Landsat, and being retransmitted in real time. Up to quite recently, transmissions over the SPINE network were between earth stations equipped with both transmission and reception, so that automatic re-runs could be instituted in the event of data transmission—which runs at 1 Mb/s—being corrupted. But bit error rates have been so good, something like 10^{-9}, that the European Space Technology Centre took the risk of a demonstration at Vienna in August with a receive-only station transmitting Landsat pictures from ESTEC in Holland, and survived two weeks of demonstrations without failure.

The implications of this are that it would be quite feasible to send a computer-held document in data form at 1 Mb/s to a remote receive-only station, from a central library, itself equipped with a transmitting dish, and that this document could be simultaneously received at a number of terminals. The search for such a document could, as in Vienna, be initiated by terrestrial means—say over EURONET. There is no reason why dishes used for television distribution during the evening's entertainment session, should not be coupled to data modems for overnight delivery of texts, and indeed this is the object of Project Apollo, sponsored by the EEC DG XIII department, and designed as a pilot scheme for the storage, indexation, retrieval and dissemination of computer-held full texts, using OTS as the transmission medium. The technology has, I believe, now been demonstrated. Project Apollo will explore the costs through a pilot trial, and it will be you and your colleagues who have to decide whether this extremely rapid method of full text retrieval and delivery will command a market at these costs. But it should not be necessary to go to the full expense of holding full texts on the computer. Satellites can facilitate the use of high-speed facsimile transmission. Remote production of newspapers by this means has already been demonstrated from Fleet Street to Frankfurt. The same principle was also used in the Vienna experiment, with a facsimile machine developed by Agfa Gevaert which transmitted an A4 sheet in 4 seconds, so such a system could be coupled to a normal hard-copy library, and 100-page reports distributed to a large number of locations in about 10 minutes.

The last of these technology tests is Project Universe, which has not yet been fully implemented. This project will link local area data transmission networks—colloquially known as Cambridge Rings—which themselves link computers in a number of British Universities, and use the OTS transponders to link them to local area networks at other universities and research centres. The possibilities of using this for inter-university library search and dissemination can then be explored.

So far I have been talking about test programmes. When can you, the users, expect to see some of these things implemented. Well, next year, God and Ariane permitting, the Eutelsat organisation should have an ECS satellite in operation, with the special services package, which will enable 5 metre earth stations to be operated through most of Europe. It is expected that about 50 transmit and receive earth stations will be accommodated by this package, and British Telecom's share, which they will be marketing as SATSTREAM, will be 12 of these stations, but it should be possible to have many more receive-only stations taking signals over this system, and this is over and above the international services between large earth stations provided by the first ECS to be launched.

Later on in the year Eutelsat will have a share in the capacity to be provided by the French National satellite Telecom 1, which also has five transponders dedicated to small-station use.

In 1986, Britain should have its own National satellite UNISAT, which, besides having two Direct Broadcast TV channels, capable of being received on 90 cm dishes throughout the UK, will also have a number of channels available for business use. They may include a transatlantic as well as a UK capability.

Finally, and also in 1986, L-Sat will usher in a new era of high-power satellites, to demonstrate new frequency bands for point-to-point communications, and a more powerful system for business use—covering more of Europe with smaller earth stations.

In conclusion—the era of satellite communication is very much with us.

The BLEND-LINC project on 'electronic journals' after two years

B. Shackel,*
D. J. Pullinger,*
T. I. Maud† and
W. P. Dodd†

*Department of Human Sciences,
Loughborough University of Technology
†The Centre for Computing and
Computer Science, University of
Birmingham

Article based on a paper presented by B. Shackel at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

This paper describes the progress after 2 years of a 3½ year experimental programme organised jointly by two Universities as the Birmingham and Loughborough Electronic Network Development (BLEND). The aims of the programme are to explore and evaluate alternative forms of user communication through an 'electronic journal' and information network, and to assess the cost, efficiency and subjective impact of such a system.

After summarising the background leading to this research, the project is described which involves the development of various types of 'electronic journal' with a community of initially about 50 scientists (the Loughborough Information Network Community—LINC). In this project, the journal procedures involving authors, editors and referees are being studied, up to the point at which editors accept pages for publication. The scientific subject area of this experimental programme is 'Computer Human Factors'. Each member is expected to contribute at least one research article and one shorter note in each year of the project, and may also use other forms of communication such as messages, newsletters, annotated abstracts, workshop conferences, co-operative authorship, etc.

Considerable problems have been experienced with the hardware available to LINC members, with communications equipment, with modifying and developing software to obtain an acceptable operating system, and with various unexpected bureaucratic and organisational difficulties. These problems and the results to date will be reviewed. Nevertheless, more than 20 papers are in the system and the first number of the 'Computer Human Factors' experimental electronic journal was open to LINC members on 1st October 1982.

Introduction

ELECTRONIC COMMUNICATION NETWORKS enable people to exchange information, views and ideas by means other than paper and the spoken word. Material to be exchanged is entered into a computer store by

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a variety of means, and is accessed online through local terminals. These networks are relatively new and in the United Kingdom little explored from the user's viewpoint. Research is needed to establish their potential and to assess the problems and costs of using them for different purposes.

As a result, approval was given, by the British Library Research and Development Department, to a proposal to establish an experimental programme in electronic network communication. Birmingham University is providing and developing the hardware and software facilities, and Loughborough University is developing the documentation, training and the information community; thus we are organising the Birmingham and Loughborough Electronic Network Development (BLEND). Using the host computer at Birmingham University, a community of initially about 50 scientists (the Loughborough Information Network Community—LINC) is connected through the public telephone system to study various types of electronic journals and to explore other possible types of communication through this form of network.

The BLEND System therefore starts with the aim of experiencing and studying the problems of setting up an information community and establishing an experimental electronic journal. The concept of the electronic journal is one which involves using a computer to aid the normal procedures whereby an article is written, refereed, accepted and published. With the help of suitable software an author may enter a text into a system, and the editor, referees, and ultimately the readers, as well as himself, can have access to the text at their computer terminals. The procedures involved are somewhat similar to those already developed by various studies in the area of computer conferencing.

Background

The early research in computer conferencing began at the Augmentation Research Laboratory of Stanford Research Institute, at the Institute for the Future in California, and in the Electronic Information Exchange System (EIES) at the New Jersey Institute of Technology. From this early work computer conferencing is already established as a growing medium to aid scientific and technical communication[1,2]. It is a logical development from computer teleconferencing between scientists exchanging ideas and drafts of papers to envisage using such networks as a basis for 'publishing' papers.

Several people have suggested the use of this medium to assist or even replace the traditional form of scientific publishing, that is to produce 'Electronic Journals'[3]. This appears attractive in view of the rising costs of materials, production, publishing and library facilities. A study of the scientific information system in Britain has recently been published[4], in which it is shown that this system, so long taken for granted by scientists, can no longer be regarded as stable. Recommendations are submitted for urgent consideration by the public authorities responsible. In the chapter of the report which reviews the impact of various new technologies, the electronic journal is seen as 'perhaps the most radical innovation in prospect for the primary literature'.

The first 'Electronic Journal' project was established with funding from the National Science Foundation on the EIES network for 3½ years from October 1976 to March 1980. Within that programme there was a project to explore a traditional form of refereed papers journal for 1½ years, October 1978—March 1980. The planned British participation was prevented by a Post Office embargo at that time. Although this project did not achieve all its objectives[5] some useful insights were gained about the human factors of teleconferencing technology and some lessons may be learned from the problems and possible reasons as suggested by various persons involved with it (see Table 1, which contains our conclusions based upon the available evidence).

TABLE 1. *Problems with the 1978–80 U.S.A. Refereed Papers Journal*

1. Too many projects and users on EIES, resulting in variable and often long system response delays.
2. Command structure and editing system too complex for 'computer naive' users.
3. Lack of flexibility in journal procedures (e.g. only online input permitted, and absolute assignment of copyright required).
4. Lack of status or prestige for a hitherto unpublished 'journal' probably gave it low priority for potential authors.
5. Quality and flexibility of terminals too limited in relation to possible benefits for users (it is easy to forget how much terminals have improved since 1977–78).
6. Little usage of techniques to increase involvement of user community (e.g. face-to-face meetings etc.).
7. Project duration (1½ years) probably too short.

On the other hand, it would be wrong to suggest that the EIES project as a whole was not successful. Other types of 'electronic journals' on the system were more fully supported:- a weekly newsletter was published and found very acceptable; an unrefereed papers journal ('Paper Fair') received over 40 papers during 6 months; a structured enquiry response system among 25 scientific advisers to state legislatures was considered to be very useful.

British Library 'Electronic Journals' project

Origin

It was clearly desirable to gain experience of how such electronic journals can be operated. Therefore, shortly after the EIES Refereed Papers Journal project had started, the Research and Development Department of the British Library decided that it would be desirable to explore these concepts by establishing a research project in Britain. The initial plans placed the principal emphasis upon a refereed papers journal. While that remains the starting point, the proposal for the project recommended exploring various other possible uses of electronic communication networks, and this widening of the scope was approved.[6]

Aims

As a result, the aims of the BLEND system programme are to explore and evaluate the usage of an electronic communication network as an aid to writing, submitting and refereeing papers, and also as a medium for other types of scientific and technical communication. The approach proposed and adopted aims to be experimental rather than merely exploratory. Although the necessary start is to get a usable system into operation, the important part is thereafter to experiment with alternative procedures and types of communication and to evaluate them properly.

To further these aims it was planned, from the start of the 3½ year programme from mid-1980, that several different communities, with different types of work and subject contents, should be brought on to the BLEND system during its 3 year operating life. Two such communities are already using BLEND, and others are under discussion.

The remainder of this paper will summarise the plans and progress during the first two years of the first community (the Loughborough Information Network Community—LINC).

The LINC Programme

Plans and procedures

The subject of interest in the LINC programme is Computer Human Factors, and the members of LINC are all studying or involved with this topic. Approximately 40 members receive funds to cover telephone connection time equivalent to one hour per week at afternoon charge rates (which allows about 3½ hours per week if all connection is after 6 p.m. and before 8 a.m. on weekdays or at weekends). They have undertaken to submit one longer paper and one shorter 'dispatch' in each year of the programme.

The hardware and software facilities to support the programme are provided at Birmingham University. The large DEC 20 computer there is accessed via the public telephone network or via other networks or services (e.g. MIDNET, PSS). The operation for BLEND is based upon a computer conferencing software suite—NOTEPAD (from Infomedia Corporation, California). This is resident within a 'shell' system which further simplifies the operation for users[7].

At first the procedures for submitting and refereeing papers will be very similar to traditional practice, while members become accustomed to the technology and its procedures. After members are familiar with the technology, formal experiments will be instituted with alternative refereeing and other procedures to explore and exploit the capabilities of the electronic medium.

From the beginning it was planned to provide alternative means of entering papers, alternative procedures for refereeing papers, etc. Therefore, from the start three methods for entering papers have been provided:

1. author or secretary directly online;
2. typical typescript (with corrections) sent to Loughborough for entry via secretary and word processor;

3. perfect typed manuscript sent to Birmingham for entry via OCR machine.

Copyright is not assigned to the journal but authors undertake not to offer papers to conventional journals until three months after they have been archived in an Electronic Journal.

When refereed papers are published in conventional journals, an agreed footnote will be included such as 'This paper has been refereed, accepted and archived (in electronic form only) in the British Library R and DD experimental electronic journal "Computer Human Factors" '.

Assessment

The question of assessment is obviously central to this project. The appropriate methodology has therefore been reviewed with some care and has been published[6]. It can be considered under the four headings of cost, performance, objective patterns of behaviour and subjective experience of the users.

At one level the assessment of cost is a simple matter in that the basic parameters are defined by the budget proposed. A predetermined amount of money will be allocated to each funded member of the Loughborough Information Network Community (LINC). With the aid of their log books and the data from the software system analysis programs we should be able to compute the cost in the ways required. At another level including time and other invisible costs, it is planned to model mathematically various costing arrangements that may be feasible for an electronic journal, just as today sometimes authors pay page charges but usually the journal costs are covered by subscriptions.

Measurement of performance means both that of the BLEND system in subserving the LINC and that of the people and system together. The assessment data will be considered from the viewpoint of authors and from that of referees and editor. The concentration here will be upon the success of the software, in facilitating all the processes involved. Such questions as complexity, ease of learning and flexibility will be indicated by variations in time taken, errors, etc., and also by subjective appraisals of facilities and constraints.

Objective behaviour will be assessed by formal records, log books, and the analysis of usage statistics to be gathered by the software system. These data will be compared with similar statistics of, for example, number and frequency of letters and other types of communication using traditional methods.

Subjective experience and the attitudes of users are equally important. Even if the BLEND system and various electronic journals are obviously efficient for transmitting information, there remains the possibility that users nonetheless do not like this medium of communication. Therefore, questionnaires, interviews, and special bi-polar rating scales, supplemented by open-ended commentary, will be used to establish measures of acceptability.

Within this general framework for assessment there are other more specific issues which could usefully be studied in the form of mini-comparisons. For example, members will differ considerably in their typing ability; some may learn to touch-type, some may continue with two fingers, and some may work through a typist; comparisons of cost, performance and satisfaction as a function of such different methods may be illuminating. Similarly, differences in type of terminal, especially the general comparison of teletype versus VDU, may give useful results. Again, a study to compare the workload and work procedures involved in refereeing and editing papers (and personal preferences, e.g. of those who always do this with printed text while travelling), when using conventional off-line printed text and later entry of comments versus doing the same work directly on-line with the terminal, could be a useful mini-project within the assessment programme.

Types of Journal to be explored

Types of communication between scientists can range from the very informal chit-chat over coffee, through discussion and questions at conferences, to the very formal refereed papers journal (see Table 2). It was planned that as many of these as possible should be explored during the LINC programme.

TABLE 2. *Types of communication and 'journal' planned for LINC programme*

1. Chit-chat	Informal
2. Work Messages	:
3. LINC News—network and related information in a monthly newsletter	:
4. Enquiry-answer system between experts	:
5. Bulletin—project and work progress reports	:
6. Annotated Abstracts Journal	:
7. Discussion and Questions on Papers	:
8. Poster Papers Journal	:
9. Refereed Papers Journal	Formal

Other aspects include co-operative writing and access to the journals by 'Readers Only'. Of course, the plan will be implemented in stages; the programme started with 1, 2, 3, 7, 8, and others are being introduced in due time.

BLEND-LINC in relation to the serials cycle

The activity cycle for a serial

In the spheres of publishing, libraries and information science there is growing attention towards a whole range of electronic possibilities. Since this project has sometimes been given the epithet 'electronic publishing', which it is not, its place in relation to the complete cycle of activities involved in producing and using serials may usefully be clarified.

The sequence of activities, in a series of broad functional categories, is given in Table 3. The papers submitted by authors in the LINC programme, and eventually mounted in the Poster Papers Journal or Refereed Papers Journal, are not published; they are archived in electronic form only. It is emphasised to all LINC members that, when they read a paper in the

'Journal' or take a printout of it, this paper has the status of a pre-publication draft sent to them in confidence by the author. Therefore, the BLEND-LINC programme addresses the first three activities only, above the dividing line, in Table 3.

TABLE 3. *The BLEND-LINC Place in the activity cycle of a serial*

```
Authoring
Refereeing
Editor accepting
                                     BLEND-LINC stops here
— — — — — — — — — — — — — — — — — — — — — — — — — — — — —

Publishing
Marketing
Distributing/delivering

Storing          – reading
Abstracting      – reading
Retrieving       – reading
```

The author-editor cycle

The activities to be explored within the BLEND-LINC programme, as regards a formal refereed papers journal, are expanded in Table 4. In the

TABLE 4. *The traditional author-editor cycle for refereed papers*

```
.--->     Author writes
.                                        Author sends draft to
.             :                          colleagues for comment
.         Author sends to Editor
.             :
.         Editor sends to Referees
.             :
.         Editor <= = => Referee interaction
.             :
.             :     Referee <= = => Referee interaction?
.             :
.             :     Referee <= = => Author interaction?
.             :
---<-     -   - Editor asks for revisions?
              :
          Editor accepts
                                         Author sends pre-publication
                                         copy to colleagues
(BLEND-LINC stops here)
— — — — — — — — — — — — — — — — — — — — — — — — — — — — — —

             Editor sends to Publishers
             etc.
```

first phase of the programme it was necessary to modify and develop the system until it could tolerably subserve all these activities, so that they could be undertaken experimentally. Then the possibilities and limitations of the technology, and the improvements needed, could be investigated.

Progress overview

The first face-to-face meeting of the LINC community was held on 31 October 1980, and 42 out of a possible 51 persons attended. System manuals, training manuals and membership cards (with computer log-in pass-words) were issued. Trials usage by LINC of the network began on 15 November 1980, and the BLEND system was available for full usage from 15 January 1981. Some of the milestones from the beginning are as follows:

1979	Sept.	Invited first proposal submitted to BLR & DD
1980	April	Visit to U.S.A. by Project Director to gather data
	August	Software version 1.1 collected from INFOMEDIA Software tests begin
	Sept.	Project announced by BLR & DD
	Oct. 31	First LINC face to face meeting
	Nov. 15	Trial usage of software by LINC begins
	Oct.–Dec.	Interviews of LINC members and assembly of preliminary research statistics
1981	Jan. 15	BLEND system fully available
	June–July	Structured interview survey by telephone
	August	First papers submitted and Poster Papers Journal begins
	Dec. 14	Second LINC face to face meeting
	Dec. 15–18	BLR & DD programme of seminars about BLEND
1982	Feb. 15	Software version 2.1 (specially enhanced) open to all
	June	New communities participating
	October 1	First number of Refereed Papers Electronic Journal 'Computer Human Factors'

The first year to October 1981

The progress in the first year and the results of the first user survey have been described in Shackel[8]; they are summarised here under the headings of software and survey.

Software

The NOTEPAD software system was chosen for its reliability and simplicity and for its data recording and analysis components. However, it was recognised from the start that NOTEPAD would need to be modified and developed for journal usage. Version 1.1 was mounted in September 1980; from project team tests some first changes were made by Infomedia and Version 1.2 was mounted for the January start. From trials usage by LINC members, and from the first two months of system usage, a substantive set of requirements was negotiated with Infomedia for successive development and provision in Versions 1.3 and 2.1 (scheduled for May and September but delayed by problems at Infomedia).

At Birmingham, in addition to organising all the computing work and the successive developments with Infomedia, the team members have contributed major enhancements to facilitate users moving about the system, to enable files to be copied easily from one separate part of the system to another (e.g. from one journal to another), and to provide a choice of text editors. Thus, the project team provided for the development of the software system as far as possible at that time towards a form appropriate for the types of usage involved. Experience and tests would show what further improvements are needed from this first basis.

Survey

In June–July 1981 a questionnaire survey was conducted by telephone[9]. About one-third of LINC members were regular users, another third intermittent, and the other third had not entered at all. The intermittent usage was caused by pressure of regular work, balance of priorities, difficult access to terminals, etc. The non-usage was caused by lack of equipment (see later). The pattern of usage and reasons are similar to the results of the USA refereed papers journal project.[5] The documentation supplied to users was considered useful and entirely sufficient. The user support provisions were strongly commended.

By the end of the first year of LINC in October 1981 there were two papers archived in the Poster Papers Journal and four other papers were in various stages of progress.

The second year to October 1982

Assessment of needs

Both the discussion parts of the questionnaire survey and the experiences and observations of the project team have identified a wide range of desirable improvements to hardware, to communications and to the NOTEPAD software. These are grouped together under four headings below, and then the progress is surveyed in the next two sections.

Hardware and communications. The diversity of hardware and the limited standardisation between terminals and other equipment from different manufacturers is the biggest problem. Therefore, graphs and diagrams are limited to the alpha-numeric symbols and spacing available, in effect, upon an 80 column by 24 line typewriter (80×24 being the nearest to a common denominator amongst Video Display Units). The potential need for better graphics has been expressed by most users.

With regard to communications three needs have been emphasised: auto-dialling, auto-login and faster speed; these are apart from frustrations caused by installation delays, unreliability and line noise interference. To integrate the usage of this type of system into busy working lives, users clearly need to save time and especially memory load; auto-dialling and auto-login would save both. Again, for interactive usage over public telephone networks 300 baud (30 characters per second) is becoming standard; but the 1200 or 2400 baud minimum reasonable speed for scanning and editing lengthy text is only now becoming readily available.

Consistency. The human-computer dialogue needs to be consistent from the level of abbreviations for commands right through to the actions required at points where the purpose and procedure is similar to the user's previous experience (as for example with a typewriter). Using the last point as an illustration, the original ending for messages in NOTEPAD was to strike the carriage return twice; however this method is what many typists are familiar with doing between paragraphs, and also it could not be used in a conceptually consistent manner throughout the system. This has been changed to a control command which is used either in a local microcomputer, or in the main computer editor, or in ending a message in BLEND, to mean one and the same thing in each case from the user's viewpoint.

Handling large pieces of text. The demands on software facilities for handling paper-length pieces of text in writing, editing and reading are very different from, say, those for average message lengths found in electronic mail. In BLEND, pieces of text the length of a paragraph need and are now able to be written, edited or read either separately from, or embedded in, the rest of the paper. Editing has been introduced at 3 levels: a simple line replacement editor with 3 commands when writing messages or text (in conjuction with the standard back-space delete facilities); a choice of text line-editors with intra-line facilities before sending text; replacement of a whole paragraph with an edited version (or completely new text).

Other facilities are needed to facilitate local preparation of text (e.g. in a word-processor) and transmission in a 'block' to the host computer at Birmingham. Similarly, facilities are needed to prevent anyone adding (accidentally or otherwise) comments and messages to prepared public texts such as newsletters and journal papers, while at the same time enabling precisely that kind of response in an appropriate location.

'Knowing where one is'. The contents of the BLEND system may be considered to be in a 2-level hierarchical tree structure (level 1 = PROJECT and level 2 = ACTIVITY—the names given by NOTEPAD). Users read and write in the different 'conferences' at the ACTIVITY level (see Table 5). It is a common experience that 'knowing where one is' is substantially harder without the secondary cues with which we are all familiar when finding our way around filing systems or journals. BLEND has sought to alleviate these difficulties by (a) giving cues to 'where one is' in the form of the title of both

levels as automatic reminders; (b) enabling the user to check his position with 3 key presses to get the titles of both levels; (c) enabling the user to set a page title as a constant reminder if so desired; (d) giving cues of where other users are whenever the list of ACTIVITY titles is presented. These minor modifications may be considered as only a start to this very real problem for any structured database.

TABLE 5. *NOTEPAD structure as used for BLEND-LINC*

PROJECT: News	*PROJECT:* Author	*PROJECT:* Poster	*etc.*
ACTIVITY:	*ACTIVITY:*	*ACTIVITY:*	
1. Messages	1. Advice and Help	1. Editorial Messages	
2. Chit-Chat	2. Messages to and from Editor	2. Poster Papers Index	
3. Who's Who	3. Private to Author - Smith etc.	3. Dodd WP - (Title)	
4. LINC NEWS etc.		4. Wilson P - (title) etc.	

PROJECT is like a separate forum or conference building
ACTIVITY is like a separate group meeting or conference room

Within each Activity members may:- write and read (private) NOTES; write and read (public) ENTRIES; check STATUS; EDIT; use other SERVICES, such as RUN programs (e.g. to SEND a paper from a word-processor; or to COPY a file from one project to another; or to READ a paper and be able to skip to and fro between paragraphs or from a paragraph to the reference list and back again, etc.); use SELECT to join another Activity; or QUIT that project.

Software development

Most of the changes to the software needed and specified to improve consistency, handling large pieces of text, and 'knowing where one is', were accepted by Infomedia for implementing in an agreed version 2 of NOTEPAD for BLEND. This was scheduled for September 1981, so that by the start of LINC's second year the BLEND system was expected to be in a tolerable form for usage for journal papers.

For various reasons Infomedia was unable to keep to the agreed schedule. While in the USA during September to end November 1981 the Project Director (Shackel) was able to visit Infomedia at the end of October. The purpose, rationale, method of operation and display formats for all the agreed improvements were worked through with the Infomedia staff member who would be implementing them. Also the changes planned by Infomedia for version 2 were similarly reviewed. After further delay caused by loss of the tape in the Christmas mail, version 2 was finally tested and opened to BLEND on 15 February 1982.

As experience has been gained with proper usage so other needs and possible improvements have been recognised. The facility within NOTEPAD enabling programs to be RUN, while still remaining inside that software suite, is being used by the project team to develop and test enhancements. So the program READ (see Table 5), a software aid for reading on-line, has been developed and is now on open trial, and the specification for a program REFEREE, to give software support to refereeing, is at present being reviewed.

Progress

Hardware. Advice on hardware and communications has been provided by the project team from the start. However, since funds could not be available to provide all members with terminals, they have had to use whatever equipment was available to them or could be purchased from other funds. As a result many difficulties have arisen not through fundamental limitations of present technology but because of the differences in technology or the experiences of various individual members. For example, at least two members have only the older teletype working at 110 baud; several members have direct, i.e. very fast, access into large computers with operating procedures which are different from DEC and NOTEPAD, and so have problems in learning new methods for familiar tasks; some members are familiar with other mail or conference systems, such as ARPAnet or COM, and thus again have problems with 'unlearning' different procedures.

Communications. The aspect of common experience is the need for a faster communication rate to subserve the online interaction when reading, editing or refereeing papers. From the very beginning the project team aimed for at least 1200 baud (120 characters or 20 words per second) in both directions. At first modems were not available from British Telecom, and then considerable problems were experienced with the installation at Birmingham. During this year experimental usage has continued in three locations, with mixed results because of spurious signals apparently generated inside the modem in response to line noise. Other solutions are being investigated.

User support. At the same time as the software developments, and to make support information consistent and easy for a mixed (computer-naive and computer-experienced) community who are mostly occasional users, all user support materials were fully revised. In addition to the '?' facility of NOTEPAD, the support consists of a small credit card sized log-in and structure reminder, a users guide, online help, and a one working day response via answerphone for problems. The users guide has the majority of information accessed by two different routes, one as a list of facilities (i.e. what is traditionally offered in manuals) and the other as structured sequences of typical actions that a user may wish to do. Designed as a rapid access aid, this has been well-received and is undergoing further testing, iterative refining and validation.

Usage. The pattern of usage has remained much the same as was found in the survey during the first year (see above). This is to be expected since the reasons for occasional use remain the same—fitting this voluntary activity into an existing work schedule, balancing priorities, and access to terminals. A special Users' Conference was held on-line in BLEND-LINC from 4th October 1982 for 3 weeks, to review LINC experience so far and to assist with planning the programme for the rest of the project to the end of December 1983.

Papers and Journals. Despite the difficulties there has been considerable use of the system for various types of more informal communication. Moreover, there were at the end of the second year 12 papers mounted in the Poster Papers Journal, and 8 papers offered to the Refereed Papers Journal. The first number of the latter, 'Computer Human Factors', had been archived with an editorial, four papers, a book review, and 'Activity' locations for discussion and questions by readers on each; 'Computer Human Factors' No. 1 was open to LINC members on 1st October 1982.

Appraisal

So, it may reasonably be asked, how far has progress reached toward the communication of research results via electronic means? The brief answer is 'perhaps just about at first base'.

There have been a number of prospective studies, such as those by Lancaster[10] and Meadows[11] and the Royal Society[4] report (1981) to which reference has already been made. Quite properly all point to the vision; and we believe the vision is valid and not a mirage. But there are many technological slips on the way.

Moreover, many organisational, bureaucratic, social or psychological problems were revealed by the first year survey, and subsequent experience, to add to the present technological limitations. Some of these are listed to illustrate the diversity of difficulties which beset the introduction of a radically new system into existing situations:

1. Delays up to 5 months in installing lines and modems by British Telecom.
2. Bureaucratic and 'political' resistance to installing less noisy direct telephone lines instead of going through the campus or institution switchboard, because they are not under control nor monitored by the organisation.
3. Existing equipment, e.g. mainframe or local network, not able to be used to connect to an outside computer.
4. Therefore, existing familiar procedures (e.g. familiar editor, network commands or local mainframe command language) not able to be used, with consequent 'unlearning and new learning' penalty to use BLEND on DEC20.
5. Bureaucratic and 'political' resistance to a terminal being in a LINC member's room (e.g. this might unbalance status relationships, or the terminal must be seen as 'owned' by the institution and not by the individual).

6. Dislike or avoidance by users of the conflict situation when others are found to be using a shared terminal or modem or external telephone line.
7. Time constraints upon the use of equipment at the user's end, and upon the use of the Birmingham DEC20 computer during term time (10–12 and 2–4 weekdays) because of teaching class workloads.

The attitudes inside institutions towards 'ownership' and control of new technology may be expected to change as the general attitudes in society change. The technology will improve considerably; indeed all the facilities which we at present speculate to be needed do exist somewhere already, but of course at a price.

The ultimate and most important issues are those addressed by psychology/ergonomics/human factors. The terminals must be easy to use and appropriate for the tasks involved. The software must be easy to learn and well-matched to all the procedures required of it by the users. The whole system must be readily available, and either be easier and quicker to use than existing methods or be so much more powerful that the extra time or effort involved is considered by the user to be on balance an acceptable cost.

These views are reinforced by the attitudes of LINC members in response to the various problems over the two years. They have reacted not as might be expected in response to research difficulties but more in an 'all-or-nothing' way; this response is entirely reasonable. They are not members of the research team with a formal commitment to the project; they are busy researchers, system designers or teachers who often react to BLEND as to other facilities or services. If access is not particularly easy and if using it is not especially relevant to this week's or this month's main work tasks, then it will have to wait (exactly as do the successive issues of journals on the shelves of the library across the campus, even very relevant journals, when students and other priorities are pressing).

Therefore, it seems evident that one other requirement must be satisfied in addition to the issues discussed above. If a significant process is to be integrated into the regular pattern of daily work, then it must be reliable and fully operational for 24 hours a day, and it must be available on or beside the work desk exactly as is the telephone. While this opinion may seem self-evident in some circles, its acceptance and implementation to subserve electronic journals for scientists may take somewhat longer.

Conclusion

Many difficulties have been experienced by users, for example with organisations, telecommunications and software systems, in trying to incorporate use of the BLEND system into their established working routines; nevertheless BLEND has been developed as planned and anticipated in conjunction with LINC. Twenty papers have been submitted by LINC members, 12 to the Poster and 8 to the Refereed Papers Journal. This progress could reasonably be compared with the time schedule for the start of any new journal. These papers and the willing participation of the LINC community continue to support the breadth of experimentation originally envisaged for this programme.

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AUTHOR'S NOTE

1. This paper is based upon an invited presentation to the Aslib Annual Conference 21–24 September 1982. It has been refereed, accepted and archived (in electronic form only) in the British Library R&DD experimental electronic journal '*Computer Human Factors*'.
2. Because of the interest widely expressed in this British Library sponsored research project, the Editors of Aslib Proceedings, of Human Factors and of The Computer Journal have kindly accepted this paper for parallel publication.

The impact of new technology on the information profession

M. A. Simkins

Smith Kline and French Research
Limited

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September 1982

BEFORE CONSIDERING the impact of new technological developments on the future of the information profession, I want first to look at our present position as a result of the technological developments of the last twenty years. These can be considered under four headings:

(1) Jobs have been created for those information people who also have computer skills, in the design and development of information storage and retrieval systems, both for large international databases and for in-house files. As a consequence, there are also jobs in training users of these systems.

(2) The use of computers, and more recently word processors, has helped to cut down on the routine and repetitive operations—sorting, filing, retyping, proof-reading, searching through indexes.

(3) Online literature searching has enabled us to give our clients a better service—the turn-round is faster, the information is more current, the scope of subject matter is much wider. To take just one example, we can now do effective chemical substructure searching, which was only possible to a very limited extent before. The whole expansion of our profession is illustrated by a recent announcement of a new Dialog database for biotechnology[1]:

> '. . . includes references to conference and symposia papers, government studies, professional journal articles, news stories, university and corporate reports and independent laboratory studies. The file is of particular interest to long-range planners, analysts, patent attorneys, scientists, researchers and investors . . .'.

That demonstrates very clearly the scope both of our sources and of our clients in a scientific field.

(4) There has been a change in our status in two respects. Ten to fifteen years ago the development of in-house systems, often with elaborate coding for data retrieval, led to a situation where one group of information scientists were gathered round the computer and were the only people who could communicate with it, so they became essential intermediaries,

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but at the same time rather remote from the people they were meant to serve. This phase has passed—mini- and microcomputers and improved data collection systems have brought the databank back to the user who creates the data—but while it lasted it led to the creation of project liaison officers who stayed close to the users and helped them in all their work. This was a helpful development—a recognition of information work as part of the research process.

More recently, the development of online searching has created a situation, not only in industry but also in academic and public libraries, where an information officer can provide a valuable bibliographic service which is very nearly inaccessible to the other library users. We have again the essential intermediary. The situation is justified at present by the visible costs and the complexity, the variety, and the frequent changes in the services available and access procedures, which mean that only someone who searches regularly can be cost-effective. Some organisations encourage end-users to learn to search themselves, and intelligent terminals can simplify the computer access, but the experienced online searcher is a key person at present and I believe will remain so. That applies to bibliographic databases. Databanks are a different matter: their users, whether scientists using numeric data or chemical structures, or market analysts using sales figures, are already using computers to manipulate their own data, and access to data in external data banks is a natural extension of this. Searching the literature is another matter.

Although the points I have mentioned amount to considerable changes in our individual jobs, particularly as a result of the application of computers, it is worth pointing out that the overall function of my department has changed very little over the years. People come to us because they want specific information, because they want help with any aspect of literature searching, because they want information from within the company files, not infrequently because they want something that is not our job at all—fundamentally they come for knowhow about how to find information, and for service.

With respect to the future, I am hampered in my assessment of the predictions being made by my own ignorance of technology, and this brings me to my first point: that attitude will not be good enough for the information manager of the future: he or she will either have to know enough to choose his own hardware and software or will have to build up a really good understanding with an appropriate expert. In the past, we didn't have the chance to make mistakes ourselves in this area because mainframe computers cost large sums of money and were the prerogative of the computer manager. Today, and still more tomorrow, equipment within the budget of an information department could either save you or cost you a great deal in manpower. It does not follow that everyone entering the profession today needs a detailed computer training—today's expert will be out of date in five years anyway. It does mean that there is an important role for a few who really appreciate both information and computing, and it does mean that all information scientists will have to be continually aware of the broad potentialities of whatever new technology comes along. Most of all, they will have to learn to analyse their requirements logically and express them so that others can help them.

Before considering specific technological developments I want to make two predictions of my own:

(1) New technology will supplement the old, not displace it, for a very considerable time. This is partly because there is value in the old methods—card indexes still have a place—but also because of the conservatism of our clients, *not* because of the conservatism of our profession.

(2) New systems will succeed only if they provide something the user wants, and wants enough to pay for it—such as an improved service or a saving of resources. Clever technology alone is not enough.

What does the user want? Not the enormous quantity of undigested data and text which we shall be able to manipulate and store, not a list of references, but actual relevant organised information—which has to be given to the right person, at the right time, in the right quantity and the right format, and it must be accurate, reliable, and in context[2]. This is what our job is all about, and what the new technology has to help us to provide. Most of us will continue to be concerned with the technology chiefly as a means to an end.

The emphasis in Information Technology Year is supposed to be on the convergence of office technology, telecommunications and computer technology, but to discuss their effects I shall separate three aspects.

(1) *Communications*

Communicating is an important part of our job, and the ability to receive or transmit documents round the world fast, and still be able to read them, will be a great help. However this will mean a need to think fast too—when it takes a week to get a document, you can afford an hour or two to consider who to ask for it and exactly what to ask for, but if the transmission takes minutes you will have to know your remote sources as well as you now know you local ones—the enquirer will not expect delay. Electronic networks within companies will bring scattered units closer and may lead to organisation changes. Electronic mail access to a range of small information services—I am thinking of people rather than data banks—could be valuable.

(2) *Office technology*

Word processing is already with us—and a great boon—it helps with presentation and dissemination of information, which makes it more likely to be used and so increases its value. What is not in sight, and I believe will be a very long time coming, is the paperless office. The first effect of word processors is to produce much more paper than before, and (with the possible exception of computer and information people) managers still seem to want plenty of paper. They want it not only to read on trains or to scribble on, but also to send multiple copies to others, and to store in personal files. They don't want the paperless office, so it will be slow in coming.

I think it is significant that in our organisation, as in many others, it is the computer department who are in charge of word processing, but they call it 'information handling'. I would prefer 'text handling' or even 'text and data handling', but the point is that modern office systems make it easy to collect and store a large volume of formal and informal communications. To turn these into information needs organisation, and preferably with the help of people who understand the value and the use of information. As Cawkell[3] has suggested, there is a big growth area here on the fringe of our present professional interests.

(3) *Electronic publishing*

This is the area where we must expect change, and change that could affect us seriously because most of us are concerned with published products. With respect to videotex systems, we could be involved as users or as information providers—we are concerned with dissemination as well as retrieval, and it will be practicable for doctors or hospital pharmacists to access a company information system 24 hours a day. Online directories or compendia, if they are done well, could have advantages, and some people who now come to libraries for them could be using them at home.

For scholarly publishing, the electronic journal presents interesting possibilities: Figure 1, where all the connections are electronic, is excellent at the top but the rest of the picture leaves us with no contribution[5]. This version doesn't seem to be acceptable to the top authors themselves as a replacement for the orthodox journal, so it won't happen easily, but electronic communication between a group of specialists in a narrow discipline, with or without an editor, could be very effective as a form of invisible college. In a recent article[4] in *Chemistry in Britain* I noticed a chemist offering to share a data-bank through the computer network with his readers, and one reason was that, as he said, publication is 'a slow method of disseminating information'. Invisible colleges have always been a problem to the information scientists, because we are naturally on the outside—if the subject matter is vital to us we have to find a way in through our own experts or consultants.

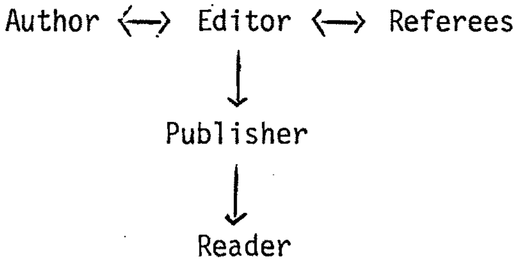

FIG. 1. *Electronic publishing in 2001?*

A more realistic picture (Figure 2) includes the production of primary journals on paper but recognises that the way they reach us could change. Wide access to primary journals is important not only for reading but also for scanning, because the individual, especially in a multidisciplinary subject, uses information from a range of journals much wider than those he would read thoroughly. Information departments find that it pays to rely quite heavily on scanning primary journals as well as using computer based alerting systems, and this is still more true for the individual scientist with an ill-defined project lurking in his sub-conscious. This figure reminds us that the form in which tomorrow's publications are stored for the next generation could change—on-demand printing from a central electronic archive is a possibility, but only if the economics are right.

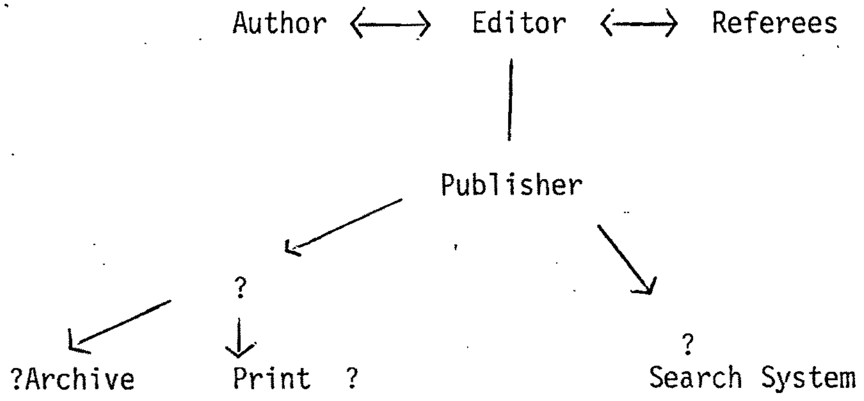

FIG. 2. *Electronic publishing in practice?*

We have not yet considered secondary (abstracting and indexing) publications. Future technology could allow us to search the whole primary literature in full text, and so do away with secondary services. Do we want that? I would say definitely not, at least in subjects with a well-organised structure and vocabulary. I think that indexing and independent abstracting, even though expensive and likely to become more so in relative terms, add to the value of a paper as well as to the chance of finding it. The present growth in the number of secondary publications or databases in relatively narrow subject areas suggests that there is a considerable demand for them at present.

Nevertheless there is evidence that the publishers of the major data bases are worried about the market for their printed publications, and we may see big changes in the way they price and package their products. Perhaps, as Charles Oppenheim[6] has suggested, the larger organisations may be offered videodisc instead of online services. We have got to get the economics right in this area because we want the best of the secondary services to survive and in fact to improve in such things as consistency of indexing and selection of papers. Future developments will also have to allow for the organisation or individual who does not have access to the latest technology.

What will become of the expert searcher in this new world? There is a growing move at present to help the end-user by making computer systems easier to use with the help of microcomputer interfaces. I expect we shall see an increase in end-users searching one or two key databases on one host, but the contribution of the expert will remain what it has always been, not only technique but a specialist knowledge of the sources in a particular subject area. At present the number of choices of database, host and communication network for a particular search continues to grow, and as soon as you have evaluated them and decided which is best value, the situation changes. The expert also differs from the end-user in a professional commitment to be systematic and thorough if this is required, and where time costs money it is the professional who is cost-effective. The balance might change if the searching system became cheaper, as it might happen if the search was run in-house. This depends on the price structure adopted by the data base supplier, because the whole data base has to be paid for: if access is cheap, there will be a charge elsewhere which may or may not help the occasional searcher.

What does this tentative look at electronic publishing imply for our jobs? I don't believe that libraries will vanish, because the material being printed today, or at least some of it, will have a lasting value and books (as opposed to journals) will be wanted for their convenience; further, electronic publications will still have to be selected and distributed locally. I don't believe videotext terminals in homes and offices will displace information services completely, because on many occasions enquirers want to discuss their problems with someone and to be directed to a recommended source—they want advice as well as data.

I think many scientists, as at present, will do simple literature searches for themselves, quite likely online, but they will turn to experts for more difficult, more complicated or more thorough searches. I think that as long as a friendly and efficient service is provided, it will be used.

Over the whole information profession, we can expect to see wider development of our interests—into ephemeral material, into business information and companies' communication systems, into quite new areas. It will remain important for the information specialist to be familiar with the subject matter of the field he works in and the problems that matter to his clients.

Two of the main effects of new technology will be a great increase in the amount of material available in machine-readable form, and a great increase in our ability to store and search such data. This surplus of data, waiting to be turned into information, will be our biggest problem.

The role of the information specialist will be, as at present, at three levels:—*system design and development; analysis, retrieval and integration of data to provide usable information;* and *education.* Working information officers may well find that they have to put more effort into teaching their clients to use the tools that are designed especially for them, and the designers of new systems also have to budget for substantial training costs, especially with rapidly evolving systems. But the overall responsibility of the profession, even more in the future than at present, should be with the value and quality of the information supplied to the user.

I was asked to consider the sort of person who might be attracted into the profession in the future. I think there has been a gradual development already in the relative importance of different qualities: there is already less place for the patient plodder because this is precisely the person who can be replaced by the computer. The rate of change makes adaptability, the ability to learn new tricks, important, and dealing with computers requires both logic and, when entering material or checking or searching, accuracy. Apart from that, my list of desirable qualities is much what it always has been: they include intelligence, thoroughness, commonsense, friendliness and ability to communicate. A large organisation can afford to have the friendly personality and subject knowledge in one person and the systems expertise in another, but in a small organisation you have to compromise as best you can.

At least we can be sure that the future will be challenging, not boring, but the important thing is that the new technology should be servant, not master, and that it should enable us to provide a better information service.

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The influence of technology on professional curricula

K. J. McGarry

School of librarianship and Information
Studies, Polytechnic of North London

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Introduction

MY PAPER deals with three pivotal and interrelated problems: the growth of information technology: a cluster of professions involved in various ways with this recorded information; and the curricula which provide the necessary framework for the education and training of these professionals. My views are those of a lecturer and a manager of learning resources and, as such, are coloured by my own experience and from thinking, reading and arguing with colleagues.

I begin with an assumption from general systems theory: that libraries, information services information agencies—and the people who design and manage them—are not alone in the universe. They are part of the wider society and are affected by the changes taking place there, both in their attitudes and techniques as information professionals and the ways in which those attitudes and techniques are distilled into learning experiences for students. It is worth remembering too, that our present students will be in the full maturity of their professional lives at the beginning of the 21st century; so our discussion necessarily has a futuristic frame of reference.

Every time there has been a spurt forward in technology, there has been a corresponding change and adjustment in the social order. Sometimes this adjustment has been rapid; at other times there has been a distinct lag. Communications technology exemplifies this generalization with telling clarity. Writing was an active agent in the spread of urbanization; its invention helped to create a new class of scribes: a bureaucratic priesthood whose functions and power tempt us to compare them with the contempoary 'priesthood' of 'datacrats'. Printing was instrumental in forming the base of modern industrial societies; the duplication of media containing coded messages (books) engendered the need for more information—and indirectly created the information scientist. The electronic era which fused communications and information storage technology is so integral a part of the texture of our lives that we find it difficult to stand back and assess what *has* been *achieved:* let alone where we are *going*. It is rather like driving without a rear view mirror.

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Karl Marx sketched a simple model of society when he wrote: 'the windmill gives you society with the feudal lord; the steam engine gives you society with the industrial capitalist'. That was in 1884. Had he been writing a century later he might have noted a shift in the power structure to a new kind of power—not land or capital—but the capacity to store, disseminate and *control* recorded information. Yet 'information': that term we proudly display in the titles of our professional schools is a tantalizing 'will o' the wisp' if you wish to encapsulate it in a finely calibrated definition. It has been called a 'commodity', a 'resource', presumably by analogy with land, labour and capital, and, even more ambitiously an intellectual grid through which we perceive our environment. I think it is used in this latter sense by Daniel Bell in his description of the 'information society' where the new information structure ensures that he who *knows* what becomes more important than he who *has* what. But like all periods of change and transition there is never a total discontinuity; older phases tend to merge or co-exist. Sometimes I think the older phases thrive: look at how paper just refuses to go away in spite of the number of references to the 'paperless society'.

But if you are planning curricula for people who are going to store, disseminate and otherwise manage this resource then these patterns of underlying change must be identified. What is past is prologue, to be used as a frame of reference. As for the future the curriculum planner, like all managers, must necessarily look further than he can see.

At bedrock level there is nothing fundamentally new about the problems we face. Societies of whatever stage of development have always had information storage systems; and the corporate memory has ranged from myths, sagas and lengthy epics to the machine readable databases of today. The major difference lies in the speed and capacity for storage transfer and dissemination, and in complexity of need. Whether the capacity of our brains has developed commensurably is a point for debate; but the human concept system will always be at the receiving end of the information system if data and information are ever to become active knowledge.

Once society's memory can be preserved in tangible forms a special group is given the task of preserving and facilitating the use of these accumulated records; all the way from cuneiform tablets and papyrus rolls to video discs and 'bubble memories'. This group must keep pace with these technological changes and adapt their management skills accordingly—to modes of storage and to problems of access. Society may expect nothing more of them; and the expectations of the wider society are a powerful influence. If the resources of this corporate memory are restricted to the privileged few, then techniques will chiefly be centred on a policy of protective conservation. Then the objectives of the curriculum planner are reasonably clear. Short practical courses are required, or better still the techniques can be learned on the job. Once society commits itself to sharing these resources then the storage system has to be linked with a system of transfer and new ways found of providing physical and intellectual access to these documents. When this activity is set in motion then a new set of skills becomes necessary because the documents will have to be matched with individual or with group needs. But if we take the activity a stage further and we require the coded messages in these documents to be *analysed and interpreted* then a new battery of skills: subject knowledge, critical acumen and communication expertise is necessary. Not only technical skills but a new type of *understanding* is required. An understanding that sees the instrumental function of information work within the aims of the wider society whether these aims be concerned with material progress, education expansion or other facets of human welfare.

The library/information context

The problem facing us is that the training and education of this special group has lagged behind. Despite the venerable antiquity surrounding libraries, education and training for librarianship came very late in the day: at the end of the nineteenth century, in fact. Before that it was useful (and sometimes necessary) to be a scholar but in most cases aspirants to the profession did not have to undergo any special training. The knowledge base of society was a closed system; users (as we would understand the term) did not exist. Libraries existed for scholars, book selection was usually at the initiative of others and reference services were not expected. True enough certain qualities were desirable: a sense of order, accuracy, punctuality and politeness. The librarian's skills did not involve him in interpreting the documents under his care; the less he knew the less he could interfere; criteria closely resembling the employment of eunuchs in the harems of the East. The next phase came when the educational, industrial and political bases of society widened and information became a social and economic need. The more complex society became; the greater the complexity of need for varieties of information.

The curriculum now required not only an ability to identify, store and organize documents but an ability to mediate these documents. This was the first great challenge: dealing with people. It is much easier to teach author and title cataloguing than to teach effective interpersonal communication.

The rapid growth of communications technology not only influenced the social developments just outlined, but also helped to stimulate the growth and fragmentation of knowledge; new subject disciplines were created; they fused with another and created newer subdisciplines. The way they did this was somehow related to their patterns of bibliographical control and access. In a metaphorical sense these disciplines could be said to 'behave' and the observation of this behaviour became a systematic study. Information science grew out of the use of, and research into, automated retrieval systems; in the opinion of some it took on the mantle of an older activity: documentation. Here begins the concept of interdisciplinarity. As in so many other fields of endeavour innovations are initiated by newcomers from other disciplines. In the U.S. and in the U.K. important beginnings were made by a number of applied scientists, behavioural scientists and applied mathematicians. This embryonic discipline was enriched by Merton's[1] work on scientific norms; Derek Price's[2] continuum of 'hardness' and 'softness' applied to the domains of knowledge, and in the next decade by Ziman's concept of 'scientific consensus'[3]. There is also another change taking place—dare I use the term 'convergence'. In the traditional sense one could parallel librarianship, and information science with the two cultures, but the signs are that this is no longer so, and it is an added complexity in curriculum design. The computer does not separate them; the automation base of mainstream librarianship demands automation skills. An analytical approach to problem-solving was once the prime concern of information science; public librarianship literature is full of mathematical models, statistical descriptions and quantitative approaches to performance evaluation. The vigorous outreach policies of some public libraries exclude those young assistants who came into the profession for the shelter of four walls. For the newer type knowledge of user communities is necessary, different but no less intricate than the subject based communities in research establishments. Technology can be an integrative influence as well as being an instrument of fragmentation.

Curriculum design and implementation

Any curriculum, whether professional or academic, is a map of reality—that is a reality as perceived by those who make the map. Included within its scope are those who teach; those who are taught; the social and vocational relevance of the content; and a mental picture of the needs of those who are to benefit from services of those produced by the system. Curriculum is not an elegant synomym for syllabus; it included the aims and values of the community for whom it is designed. It cannot be a closed system if it is to be effective. To plan a curriculum for a profession involves a diagnosis of needs; the formulation of objectives to meet these needs; the selection of appropriate content to further these objectives and the design of teaching situations to interpret this content in the best way. We have not done this. We still have no more than the haziest notion of what the needs are—whether those of employer or individual user. Professional curricula have traditionally been centred on the document—more specifically on the book. Communications technology generated new media of storage which demanded new methods and techniques for their identification; storage and retrieval. The ensuing management problems engendered a clustering of map librarians, audiovisual librarians, music librarians, serials librarians who began to cast a cold eye on library school curricula, and the path of the curriculum designer became hard—very hard. Librarians serving specialized communities demanded 'off the peg' fully trained products and wondered why such people were not forthcoming. Despite this seeming obsession with the new there were also sharp reminders of the conservation function of the profession. Researchers in the humanities were worried lest the transfer of primary documents to electronic media might distort their research value; where were the courses in the management of archives and manuscript collections? Where were the courses in the conservation of materials?

If we briefly follow the steps in curriculum planning which I have just outlined then we have to know more about the external information environment of need—and of future employment for our graduates. We have to walk the ground thoroughly if our map is to be no more than an amalgam of our vain imaginings. In short we need research. At the moment we rely on travellers' tales, and from those we glean that technological change in the field of information services is both rapid and complex; that the boundaries between information providers and information users is becoming blurred, that the wider use of videodiscs will mean a decline in the use of online information retrieval; that technology will have an inevitable de-skilling effect on the professional and that the original high hopes for the validity of user studies are considerably lower—if not dashed completely. That the advance of teletext and viewdata systems will eliminate the need for reference services; that electronic publishing and the bringing of end users into direct relationship with systems will give the final blow to our mediatory role on which we have so often prided ourselves. We even hear of 'fifth generation computers' that will be able to see hear talk recognise human faces learn from mistakes, and think; in short that we shall soon be sharing the planet with intelligences equal to if not greater than our own. It is all very intimidating and it is tempting to the schools to monk-like let the legions thunder by and return to our own meditations; but one of the deeper effects of technological change has been to make us think about the differences between training and education. Bang up-to-date technical training is beyond our scope, but education, in the sense of inculcating an appreciation of the use and limitations of information technology, is not. Education connotes something of value; something permanent; a framework of readiness that can adapt yet still retain its identity. The curriculum planner has to base the curricula on issues and problems that will still be important at the end of the century. Language we fondly hope will still be with us, along with the need to study its communication complexities and its place in information storage and retrieval. The growth of computer stored information and information on videodiscs will demand even better indexing systems suited to a wide variety of customers.

Basic human information needs will remain the same and so will human motivation; future curricula will have to include the study of human information processing and human creativity. People will still need to communicate with one another and to have information, not just documents, presented for them in ways pleasing and comprehensible. Our students will need expertise in community analysis, in the abstracting, rewriting, and reformatting of relevant material. Some of these presentation skills we have already abandoned with the greater part of our former base in the humanities and to these we shall have to return for models of concise and elegant utterance and for the development of a sympathetic imagination. If information is power then technology facilitates its concentration. According to Thomas Hobbes we are all actuated in various ways by greed, vanity and fear[4]—deny it though we may. It is doubtful whether human nature will change radically by the time my school's graduates will be mature professionals. A key component therefore, of any lasting course must analyse the ethics of information and the awesome capabilities of future information technology. It is the assumption of ethical responsibility that rational distinction between means and ends—which distinguishes the professional from the functionary or the operative. Training alone will not give this. A greater dependence on, and overlapping with, other professions has already started so the curriculum must reflext an increasingly close relationship with publishing, public relations, and the mass media and leisure professions. As I said the curriculum planner must look further than he can see—I have but made inferences from human nature and based my assumption on the 'needer' of information being the only constant reference point in a rapidly changing technological landscape.

What are we doing now to implement the other steps of content, selection, and interpretation? Library and information science schools are expensive concerns; no longer one-room affairs with a few battered Deweys and out-of-date specimens of reference materials. The growth of information technology has seen to that. The overall effect on present curricula mirrors the effect of technology on the wider information environment. Boundaries have become blurred. If you teach subject bibliography you can no longer ignore the existence of bibliographic databases and automated services; if you teach management you can no longer plod along blissfully unaware of the role of the computer in library housekeeping procedures, or in the complexities of management systems. We have been forced to re-examine cherished assumptions: the library is no longer the centre of the universe of documents and information; our domain of activity is no longer exclusive to us, and other professions and occupational groups are beavering away with great verve and ingenuity in designing and managing information systems. The trouble is that computer experts, systems designers, public relations personnel mass communictors have never been a part of our map. Instead the core of our curricula have been techniques. The traditional core studies, like Caesar's Gaul, have been divided into three parts: indexing, management and bibliographical studies. As the social and technological problems of information transfer widened the general response was to accommodate them in a formidable array of optional studies. The pattern went something like this. First of all the new development—audiovisual technology or computerization—was encompassed in a general lecture in the core study to which it was thought to have the closest affinity. As the occupational relevance and technical expertise of the topic expanded so did the professional literature. Even more so did the required teaching time: and syllabus congestion was the result. The topic was then extruded from the core and taught as an option. All went well until students, who for some reason could not take the option, found their employment chances hampered; back it came into the core. It is relatively easy to 'clip on' a topic to a syllabus; but to integrate the total needs close analytical thinking on the basic objectives of the whole course. Sustained thinking is a bit like prayer: we can rarely keep it up for any length of time and we reserve it for short desperate bursts in dire emergencies. The time span for your course is limited; if something is inserted then another curriculum element has to be left out. Sometimes historical and physical bibliography have been cast into exterior darkness; and the wailing and gnashing of teeth has been not inconsiderable.

But curriculum includes people; information is created by people for people. Members of the teaching staff may have to be retrained or redirected to a radically different perspective of the subject. No light management task when a teacher has devoted a lifetime to the study of a particular area of subject matter for which the demand has declined.

Summary

The overall influence of technology on curricula for library and information science has been a benign influence; if there are malign influences it is the fault of human beings. At first there is an apparent fragmentation but when we consider the ultimate aim of information storage and transfer in society we have the challenge to integrate, and the integrating focus is *people*.

(1) It has made us redraw the traditional maps of the professional curricula.
(2) We realise that there is now a body of knowledge—an intellectual domain that can be linked with other disciplines in a fruitful way and is in itself a study of intrinsic value. Information studies can stand on its own feet and no longer needs the scaffolding of other subjects for its support.
(3) Audiovisual technology has enabled us to enhance our teaching techniques especially in the teaching of online and in the application of management games. Distance learning could well have a vital part to play in any future plans for a nationally co-ordinated scheme of continuing education in librarianship and information studies[5].
(4) The inevitable realignment of the information professions has forced librarians to reassess the former exclusiveness of their profession.
(5) Communication skills and critical abilities are at a premium in a profession that will have to decide which information is of most worth.
(6) As many of our schools' products will have to work as 'lone' professionals in organizations that may not always share or agree with their professional values or techniques our students will need to develop political skills of no mean order.

The essence of communication is the conquest of space and time; and the other papers in this conference have shown the degree of our success in virtually annihilating distance in the transmission of information, data and documents. Yes, we have the communications and information technology; our expertise and capabilities seem, at first glance, to be without limit. However, lest a sense of professional *hubris* makes us gently swoon in self-adoration there is a saying we would do well to ponder. This saying is attributed to Korzybski the famous Polish engineer and one of the founding fathers of communication theory. He considered that the longest and most difficult distance in transmitting information 'is the last half-inch between a man's ear and his brain'. This problem could provide us with a host of core studies in librarianship and information science.

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Discussion

SESSION FOUR

The following points were made during the discussion:

SIMKINS:

The end-user now needs information more quickly and has to react more positively and does not have the time and expertise to keep up with the volume of information resources. Information specialists are needed more than ever, and communication skills are increasingly important and should be taught in library schools.

Information professionals must be able to influence manufacturers and service providers to try to ensure that hardware and software are 'user-friendly'.

McGARRY:

The craft of librarianship will always exist and the basic principles will always be important. Schools of librarianship will continue to teach the basic skills, but it will be the responsibility of employers to adapt those skills to the current situation.

The teaching of management is undergoing change as the politics and ethics of information provision continue to change and the principle of free information is questioned. Marketing skills are also increasingly important.

Changes in library and information school curricula mean that the concept of continuing education is of utmost importance and short causes are particularly valuable. At present the unity of the profession is threatened and certain qualifications may become obsolete.

The role of the professional organisation

Dr. Dennis A. Lewis
Director, Aslib

Paper presented at the fifty-fifth Aslib Annual Conference, University of Manchester, 21–24 September, 1982

Introduction

> 'In strictly factual terms, we have in our Association an information organisation unique in the world, and it is no more sentiment to say that there is about it some peculiar quality of magic that holds most of those who work for it in thrall. That quality is worth all your efforts to preserve it in the modern world, and I can now only envy those of you who can still continue to play the role of the sorcerer's apprentice.'

THOSE WERE THE final words of Leslie Wilson's retirement address to the Aslib Annual Conference in Edinburgh four years ago almost to the day.

I stand before you—designated, therefore, as the Sorcerer's Apprentice.

I know what he meant but I don't acknowledge the role for three reasons:

(1) Leslie Wilson was a force for good rather than evil
(2) I was *not* his apprentice; in fact *he* quoted *me* in his paper!
(3) Remember what happened to the sorcerer's apprentice—he had to recall the sorcerer when things got out of hand!

The title of Leslie Wilson's paper was 'The Last 30 Years as the Seedbed of the Future', and it is with the future that I am concerned today.

It may appear strange that Doomsday Den was taking on by Aslib to steer the ship of state into the white waters of the future. However, change was clearly required and rest assured, change there will be! Because—I cannot say it too often—*If we do not change, then we shall be changed.*

My intentions are to give an essentially personal view, but I appreciate that it must be interpreted as a public pronouncement by the Director of Aslib:

(1) I intend to concentrate on *Aslib*'s role;
I have no mandate to speak for other organisations, although I shall comment on them and our relationships with them.)
(2) I shall identify and comment on the many changes we have seen since Leslie Wilson's paper, given just four years ago;
(3) I hope to identify the three main roles of Aslib, today and in the future;

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(4) I shall comment briefly on the interactions necessary for the effective execution of those roles;

(5) Finally, I shall offer what may appear to be a deceptively simple formula for ensuring, not just the survival but the successful development and growth of Aslib. But—dare I suggest that it applies also to the information community as a whole.

Aslib as a professional organisation

There are those who maintain that Aslib is not a professional organisation, since it does not offer professional qualifications or maintain professional standards; nor does it exert professional discipline, etc. etc.

My view is a simple one: Aslib is an organisation which, consisting albeit of corporate members, deals essentially with professional people and professional issues. I have yet to see ICI or BP or the Australian National Library walk through the hallowed portals of 3 Belgrave Square. Yet *people* do it all the time!

People belong to Aslib. Aslib consists of people—professional people.

In my parlance, therefore, Aslib is a professional organisation.

In my report, 'Aslib—The Future Beckons', which was accepted by Council in June, I identified two main thrusts to Aslibs basic activities:

1. Support for the individual professional
2. Provision of products and services for the corporate organisation

This represents the constant dichotomy which is at the same time Aslib's strength and its weakness.

For the individual professional:

Education
Training
Conferences, Seminars, Meetings
Groups
Branches
Professional Register
Research
Library

For the individual as an agent for his employer:

Translations
Information Services
Library services
Consultancy
Online advice centre
Publications
Professional register

I stress these do not represent the role of Aslib. They represent the reason why Aslib is, in Leslie Wilson's words 'unique, with some quality of magic'.

The new structures which I have proposed for Aslib reflect this magical dichotomy and will, I hope, enable us to become more magical, and certainly more effective as a force in our areas of proficiency.

Identification of and comment on changes since September 1978

In looking back over his 30 years in Aslib, Leslie Wilson identified three main phases in the development of the organisation:

1924–late 1940's	'Voluntary Association'
1950–1965	Steady growth period. Membership 1000→2800
1965–1980	A development organisation on behalf of information services generally. (Incidentally, membership fell back to something about 2000 today)

Many things have changed since Leslie Wilson sat down to write his paper four years ago—some of them have changed out of all recognition. Some have hardly changed at all. However, the general pace of change is, to say the least, 'brisk', and in certain areas has been breathtaking.

Let me very briefly review the major changes which have occurred on a national/international scale in this short period.

1. *Financial and economic changes*
   * We are now in the deepest world recession since the 1930's.
   * We have record unemployment figures in the UK. We have seen and are seeing a massive 'shake-out' of labour—my own experiences in ICI very much reflect this phenomenon.
   * There has been a drastic reduction in the rate of inflation but there is still an underlying pressure on prices and incomes.
   * The world banking system is under intense pressure.
   * National monetarist policies have resulted in some reductions in public expenditure, with some effects on education, social services, libraries.
   * We are seeing continuing real reductions in the costs of hardware of all sorts—mainframes, minis, micros, word-processors, etc. etc.
2. *Social and behavioural changes*
   * There is increasing familiarisation by ordinary people with electronic systems. Ceefax, Oracle and Prestel (public services opened 10/9/79) are examples. Electronic games have burgeoned and Clive Sinclair introduced the best selling and popular micro, the ZX80 early in 1980. This has been followed by the ZX81 and ZX Spectrum, with, I'm sure, more to come.
   * There is a generally increasing awareness by people of what is meant by IT—even by government! The significance of IT for industry and commerce generally, is starting to be appreciated.
   * The emergence of the issue of the 'information-rich' and the 'information-poor'

- * There has been a significant renewal of the realisation of the significance of the 'small-firm' in British industry.

3. *Organisational changes*

- * Recognition by management that information is a definable, tangible resource; the electronic office has helped in this. I am sure that we are all aware of the very large number of seminars, courses, books etc. etc., with which we are regaled on this subject!
- * The sharp convergence of the Data Processing and Word Processing functions—however, these are not always accompanied by information storage and retrieval systems as we know and define them.
- * In government we have had sweeping changes:
    - ** The appointment of the Minister for Information Technology on 5 January 1981.
    - ** We Now have a Minister responsible for LIS matters—I refer, of course, to Paul Channon, the Minister for Arts & Libraries. The Library Advisory Council for England, LAC(E), has been replaced by the Library & Information Services Council (LISC), with much broader representation of interests.
- * The liberalisation of British Telecom is of fundamental significance.
- * The growth of information brokerage, especially in the USA, is a pointer to the future.

4. *Technological Changes*

It is here that the rate of change has been fiercest. In certain areas, so fierce that it is well nigh impossible to keep up with what is going on!

Consider:

- * The development of the micro: Apple, Pet (1979) Osborn I, ZX80, Acorn.
- * Local Area Networks.
- * Increases in the numbers of databases and databanks available online. Well over 1000 databases are available today on a worldwide basis.
- * The rise of 'Office technology'.
- * Convergence of WP, DP and Text Processing (TP)—already referred to.
- * Euronet-Diane was opened on 13 February 1980.
- * The emergence of electronic publishing.
- * The ARTEMIS report (April 1980) and the emergence of the ADONIS consortium.
- * Full-text information retrieval is now a real possibility.
- * Fifth generation computers. Expert systems.
- * Sixth generation computers: Artificial intelligence is probable in the late 1980's, early 1990's.

And so on! And so on! But please note—it is nearly all technology push—so far, there is little demand pull.

Therefore, in the light of the many changes which have come about, those which will happen and which will continue to change our lives fundamentally, we might ask 'Is the fundamental role of Aslib still valid?'

I think that the answer to that question must be 'Yes' for, in spite of all, we are still concerned essentially with professional people, even though the vehicles for such concern are issues, politics, organisation structures, technology, etc. We have expertise, credibility and a tradition of objectivity—all qualities which will be required in even greater measure in the super-technological jungle of the 1990's and beyond. We can provide a forum for expressing demand. Therefore—and as far as I can see, also for the 1990's and beyond I see this fourth phase of Aslib development as '*an organisation which is a resource to management, both within and outside of the LIS professions*'. (LIS=library and information services)

This phase of our development provides us with a challenge, since I see within it the need for us to exercise three main roles:

Internal:	To provide membership benefits at economic cost.
Internal/External:	To provide a national and international forum for the generation and exchange of ideas on *total* information management.
External:	To represent and to influence. (esp. government, suppliers, etc.) To market a profitable range of products and services.

I'd like now to define the role of Aslib with respect to the relationships with a series of bodies including, of course, our own membership.

Apart from the membership there are 9 other relationships which I intend to cover:

Aslib membership
Potential membership, especially management
Other LIS organisations
LIS community
LIS educational system
Associate professional organisations
Government
Other national LIS organisations
Europe—the CEC
Multinational and Supranational LIS organisations

Aslib membership

Aslib's role is to provide for its members a range of products and services which will help them to achieve their personal and corporate objectives. The benefits of membership must be seen to provide value for money i.e. some return must be obtained for the subscription paid. It is for this reason that I hope to introduce a totally new subscription and charging structure for members (and, incidentally, for non-members) starting in January 1984.

Our membership is our raison d'etre and our staff are the most valuable resource that we have. Good management afforded by an effective management structure backed up by a smoothly working, non-bureaucratic council and committee structure will enable us to achieve Aslib's objective at economic cost.

In talking of economic cost, and money, I have the following comments to make on Aslib's role vis à vis its membership:

* We can no longer afford to be regarded as a sort of gentleman's club in Belgravia.
* We must make profits in order to provide investment for the future—this is the economic reality.
* The aggressive marketing of Aslib is essential to its future growth—indeed, I suggest, its very survival. Resourcefulness here must be an essential element of our marketing.
* There must be much tighter monitoring and control.
* Corporate planning is essential to the future success of the enterprise.

Finally, we must take a realistic view of the outside world, and thereby determine our responses to the changes which are happening there.

Potential membership

Theoretically, every human being on the surface of the globe is dependent on information for survival, and on the good management of information for his/her development and growth. However, the problems of managing a membership of nearly 7000 million people would pose us some pretty severe logistical problems at the present time!

I see our role so far as our *potential* membership is concerned, as being to persuade as many as possible into transferring from 'possibles' to 'probables' to 'actual'. This means aggressive marketing backed by receptiveness and resourcefulness in reacting to changing needs.

The rate of development of technology in the work environment leads me strongly to believe that:

Firstly: If we regard LIS management and staff as our only legitimate source of membership then Aslib will be an entry in the register of defunct companies by the year 2000.

Secondly: The realisation by management that information is a valuable resource which, properly managed, will improve turnover and profitability puts them into the prime target area for Aslib membership both now and in the future.

In other words, our role here is to communicate effectively with management and to persuade them that we can help. In this context, the CBI, BIM, Institute of Directors, and also the TUC, are organisations with whom we must establish good working relations.

Lest we forget—'management' is not restricted to industry and commerce. Governmental, academic, public and institutional organisations also require good management. I see no reason why, by the year 1990, Aslib membership shouldn't be counted in tens of thousands rather than just thousands.

Other LIS organisations

I refer here, at least initially, to our sister organisations, the Library Association (LA) and the Institute of Information Scientists, as well as the two other members of the Joint Consultative Committee (JCC)—SCONUL (the Standing Conference of National & University Libraries) and the Society of Archivists. It is no secret that the LA has had some problems, and I would like to take this opportunity of stating that I personally take no pleasure in seeing them in difficulties. The whole profession needs a *strong* professional organisation, and the sooner the present problems are resolved, the stronger will be the whole profession.

The Joint Consultative Committee was reconvened early in 1981, and it is a bit of a slow and lumbering beast. However, it does provide a valuable forum for exchanging opinions, and I see Aslib's role here as continuing to support the JCC.

Personally, I would like to see the JCC reacting more quickly, more positively, and more sharply to the really big issues. Of problems, we have many, but since time and resources are short, let us confine ourselves to the 'Big Ones' that matter!

I see our role also as being to encourage the JCC to be less reactive and more pro-active, but perhaps that is asking too much!

The LIS community

The LIS community is characterised as fragmented, diverse, undervalued, occasionally reactionary, and definitely service- rather than product- and market-orientated. It is conscious of huge changes taking place around and about it—and to a certain extent within it. Even so, there is no clear sense of identity. As the Library Schools don their 'Information Science' cloaks, so the legitimate and sought-after blurring of the functional boundaries lead to schizophrenia and self-doubt.

There is here a clear need for decisive leadership—particularly in the face of conflicting priorities as a result of:

- Reducing resources
- Increasing demands
- Accelerating rate of technological change
- Increasing complexity of problems and solutions

Such leadership is all the more necessary in the light of the fact that other professions and professional bodies are jumping on the information management bandwaggon. Who cannot but be aware of the huge numbers of 'advisers', 'consultants' 'info-brokers', 'management audit specialists' etc. etc. all of whom are concerned with nothing more nor less than the effective management of information.

There is a real danger here that we shall be overtaken by events, if we do not make some positive effort to change in advance of the changes in the macro-system—shades of Doomsday Den! But it isn't easy for, as with any other group of people, there is a very broad spread of attitudes, circumstances and potential—but change we must and time is not on our side.

I'd like to quote briefly from Royston Brown's paper presented to the JCC seminar on national information policy in November 1981, and which I think summarises these ideas quite beautifully:

> 'Some of us heard the starter's gun a few years ago and have already covered a large amount of the track. Some are so far in advance they have almost disappeared over the horizon. Others have only just entered the race. Some of our colleagues are still in the dressing room, reluctantly tying on their running shoes and bemoaning their lack of training for the event. Still others are sitting at home by the fireside, thumbing through their photographs of previous races they have won and complaining that the community has forgotten what a good track record they have always had.'

And Royston goes on to say:

> 'It is essential that as many people as possible within the information community are made aware of the changing environment and the need for the effective management of change if we are to avoid future direction being determined by default.'

That's as clear-cut a definition of a role for Aslib as I've yet to hear. It is based on a realistic assessment of the situation—I couldn't have done better myself!

LIS educational system

Without in any way going into the detail of the LIS educational system, it is clear that Aslib should and must have a role assisting in the effective operation of that system. It is my impression that up to the present time contact between Aslib and the educational system has been—to say the least—tenuous. Since our members are not only the products of that system, but also the users i.e. employers, then I suggest that we have a legitimate interest.

This summer a working party of ABLISS (The Association of British Library and Information Science Schools) reported that the role of the library schools had changed from a limited one of educating librarians to that of providing a broad education for 'all kinds of information activities'. But, the Working Party went on to say—'more adaptability is required to equip students to cope with the changes brought about by the rapid developments in information technology.' This is yet another example of the need for receptivity to new ideas.

The Chairman of ABLISS—Kevin McGarry—said there were early indications of a revolution which was gradually being reflected in school courses. But maybe the pace is *too* gradual, *too* slow, too leisurely! Remember, I'm not convinced that time is on our side.

As well as the quality, what of the *quantity?* Are we turning out too many people for too few jobs? If G. P. Maud, in the columns of the *LA Record* (July/August 1982) is to be believed, then we are. He suggests cutting the school intake. I remember suggesting that at the IIS Conference in Aberystwyth 3 years ago! May I reflect some of his views, for I can do no better than to quote them. I think that Aslib's role in this area is to do whatever it can to persuade and help to:

* Spend more time retraining those looking for work who are already qualified. (Kevin McGarry has already stated that up-to-date training is *not* within the purview of the library schools)
* Establish close liason between the schools, the employers, the professionals and the professional organisations concerned.

I can do no more than offer our good offices to co-operate and collaborate with anyone who is prepared to do something about these issues. If necessary, we will initiate action, but we must be assured of some *positive* response from the other responsible bodies!

On the question of numbers, although the problems are huge and complex, I feel that we really must start to get some idea of the following:

* How many *are* we?
Indeed * *Who* are we?
* *Where* are we?
* How many shall we be?
* What skills shall we need?
* What movement is there *into* the professions?
* What movement is there *out* of the professions?

The reality of the situation is that we have no greater God-given right to existence or employment than any other body of professionals. What we are, what we have and what we do are all by our own efforts. Aslib's role in this is to provide guidance and leadership—not alone, but in collaboration with others.

Associated professional organisations

The representation of members' interests in our legitimate area of professional expertise is by no means confined to the five bodies which make up the JCC. There is a significant number of other bodies in the spectrum and that number is growing all the time as the phenomenon of technological convergence pulls in more and more professionals sharing what I term 'the electronic experience'. The need to express common views and so influence government thinking is a powerful motivating force for bringing together the bodies I refer to, even though they may represent widely disparate functions in the information chain—all the way from primary producers to re-packagers and ultimate users.

Examples are:

- * Publishers Association
- * Association of Database Producers
- * Videotex Information Providers Association
- * Booksellers Association
- * British Computer Society (especially IR Group)
- * Royal Society
- * Royal Society of Chemistry
- * LA, IIS, SCONUL, Aslib, Society of Archivists. (JCC)
- * AIOPI. IMPI.

I'd like at this point to refer to an initiative which exemplifies the 'Forum' role which Aslib is particularly suited to play. John Myers and I invited representatives of some dozen organisations to the first meeting of what I called 'BIRT'—the British Information Round Table, held at Aslib in June. Unfortunately, the LA couldn't be represented but all those who were invited came, and although no earth-shattering decisions were arrived at, the consensus view was that it had been a useful meeting and that there should be a repeat, taking one particular issue as its theme. I'm hapy to suggest one: 'The exploitation of information as a resource in the revitalisation of British industry'

Government

In establishing the role of Aslib in relation to government, (i.e. HM Government) we have to keep in mind that we already have a number of distinct links with government:

- * We have many arms of government—both local and national—in membership. Over 100 government departments and agencies in the UK are members of Aslib.
- * We are in receipt of government grants—in particular from the British Library Research & Development Department for our research programme and jointly by the British Library and the Department of Industry, for funding the operations of the UK Online Information Centre.
- * We supply representatives and members of committees which advise and manage government agencies and government funded activities, e.g., HMSO, BSI, Parliamentary and Scientific Committee, etc.

Aslib's relationship with government over the years has been a happy and healthy one; one which Leslie Wilson established and consolidated in creating Aslib's role as a research association. ***However, Aslib is no longer a research association and can no longer be referred to as such.*** We do, of course, have a modest research programme under way, and our individual researchers are universally acclaimed—the names of John Martyn, Margaret Slater, Blaise Cronin and others are very well known and respected.

But times have changed. Aslib's income from the British Library for research amounts to considerably less than 10 per cent of our total income, and therefore although important and significant, it is not substantial.

I maintain that the main thrust of Aslib's role in relation to government is that of educating and influencing. Not that we are particularly well set up at the present time to do either that effectively. However, a body must be *prepared* to be influenced, and I must say that I am considerably heartened by developments over the past 2–3 years which indicate a much greater receptiveness than has been the case in the past.

Factors which bear out this contention are:

* The continuing debate on a 'National Information Policy.'
* The strengthening of LAC(E) to LISC. Moves towards LISC(UK).
* The broadening of representation of LISC and its attitude.
* The appointment of Mr. John Gray to advise the Minister, Paul Channon.
* The dim realisation by government of the significance of the information scene—especially the Department of Industry.

BUT

I'm still very concerned about a number of things which are divisive and counter-productive in this area:

* The library/information work dichotomy
* The name, function and role of the Minister, which places us in the 'Arts & Libraries' function, instead of in industry and commerce.
* The continuing orientation towards public and academic libraries.
* The non-appreciation of the significance of the 'Information' in 'Information Technology' by government.
* Our lack of unanimity or even certainty in determining what are the issues that are important.
* Our seeming lack of real influence on government.

Other national LIS organisations

Aslib is unique. That is, there is no other national body which occupies a similar position in either the national or international library and information community. However, such uniqueness does not absolve us from establishing good relationships with the national organisations in other countries. In fact, it is my strong belief that much closer ties are necessary, since the world is now referred to as a 'global village', and the all-pervading nature of information, and the significance of the flow of information across national borders is starting to be realised.

On the European scene, the previous Chairman of Aslib Council, Mr Michael Hill, 2 years ago persuaded the top people of the national bodies in West Germany, France, Holland, and Belgium to come together informally in a forum christened 'WERTID'—the Western European Round Table Information and Documentation. This body meets twice a year and provides an invaluable forum for finding out what is happening in those other countries.

Our role here is plainly to develop this means of effective, informal communication—if possible to develop it so as to encourage an ever broader exchange, possibly outside of our European borders.

Europe—the Commission of the European Communities

The complexities of the EEC scene are such as to make it almost impossible to know where to start. However, suffice it to say that Aslib has always enjoyed good relationships with the Commission, mostly, of course, through the Directorate-General XIII. We have managed successfully to compete for European research and consultancy contracts, and clearly one of our roles in Europe is to continue to offer our expertise in pursuit of European objectives.

The DG-13 is advised by the CIDST, which consists of two representatives from each of the constituent Member-countries ours being Mr John Gray from the office of Arts and Libraries, and previously Dr Andrew Wallard from the Department of Industry. There have been three meetings between our CIDST members, their departmental colleagues and members of the JCC. Our role here clearly is to raise issues of concern to us, offer opinion on the views and activities of our CIDST representatives, and generally to act as a channel of communication between the LIS community and European government—a tenuous but valuable link. Both parties are still learning about the gentle art of listening!

Multinational and supranational LIS organisations

On the global stage, I refer to organisations such as FID and IFLA—of which Aslib and the Library Association are the National Members, respectively. We must not lose sight of the fact that there are many UN agencies and others such as OECD, NATO and so on, who also have broad information and library interests and responsibilities. In addition, we have EUSIDIC and EURIPA vying for our favours as pan-European organisations.

Overall there is always the danger that we can expend much energy in this diffuse area of activity and achieve little save for a nice collection of small denomination foreign coinage in that jam-jar on the mantlepiece.

I think that Aslib has a significant and important role to play in the international arena and it is this—to maintain a broad awareness of international LIS affairs, to represent British interests, to contribute to modern thinking, and to support individual and collective action, particularly for the developing countries. However, with money in very short supply, priorities must be thoroughly tested and established. International travel and work can be expensive and our funds are low. Such actions as will be carried out will necessarily be modest in scope for the next few years at least.

These, then, are the various roles that I see and foresee for Aslib. Of course, there is all the difference between seeing what needs to be done and actually doing it. My impression, having been in post for nearly a year, is that there is a need for change and there is a strengthening will for change. It is the WILL that will make it happen.

Throughout this paper, I have been concerned with indicating positive aspects—of thinking, planning and action. May I leave you with what I will term the 'Three R's for the Eighties'. This is what I referred to at the start of my talk as the 'deceptively simple formula' for ensuring not just the survival but the successful growth and development of Aslib and indeed of the LIS community at large.

These Three R's are:

REALISM —in looking at the external world, and in assessing the options
RECEPTIVITY —to new ideas, new methods, new philosophies
RESOURCEFULNESS —in overcoming the many and varied problems which beset us

Finally, since I'm trying to cast off the mantle of Doomsday Den, and anyway, it's always nice to finish on an optimistic note, may I leave you with the words of Ambrose Bierce, who said of the future that it is—

'That period of time
In which our affairs prosper, our friends
are true and our happiness is assured.'

Discussion

SESSION FOUR (*continued*) The following points were made during the discussion:

In such an expanding field there are opportunities for more than one organisation to be enterprising and successful. Although competition is healthy, it is more constructive if organisations are pulling in the same direction. Support from government and commerce will be essential.

The appointment of a Marketing Manager at Aslib is seen as a key position. Aslib needs to establish a strong marketing base and this expertise may later be available to the membership, depending on the pressure of internal commitments.

The reduction of job opportunities may be balanced by the development of information brokers and information providers. The profession has never been analysed in terms of numbers employed and services offered.

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An aid to calculating search costs online

N. R. Smith

Science Library,
University College, Cardiff

A simple model has been developed that enables the online searcher to calculate the total cost of a search at any point during the search. The parameters of the model are simply the online search time and the number of references that the searcher intends to print. The model can be represented graphically or in a discrete tabular form, as the searcher requires, and should be applicable to bibliographic databases on most retrieval systems. It should be particularly useful to searchers who have to work within financial constraints.

1. Introduction

THE INTRODUCTION of online information retrieval systems has resulted in many new problems for librarians and information officers, not the least of which is the requirement to account financially for tasks that may never have been accounted for before. Librarians and researchers are accustomed to expending considerable time and effort on tracing references and compiling bibliographies, with little regard for the (often invisible) costs of the exercise. However, most online searchers find themselves working in an increasingly cost-conscious environment, and there can be few who do not have to account for every penny spent on online searches. The costs of these searches may be borne wholly by the library; alternatively, the end user may pay part or all of the costs incurred. In either case, the online searcher is in an invidious position: on the one hand, there is the need to produce a satisfactory result from the search for the user; on the other hand, there is the requirement to remain within any financial limits imposed by the user or the library management. This quandary is succinctly summarized in the Dialtech User Manual[1] as follows:

> 'No two searches are ever the same and the end result is usually a compromise between: (a) including a proportion of irrelevant material and (b) missing a number of relevant items. The final decision on how many items to have printed or typed, and how long to spend searching, depends on the particular needs of your enquirer, how urgently the results are needed and how much you are prepared to pay.'

Aslib Proceedings, **35** (3) March 1983, p. 123–131. Printed in Great Britain

Thus, at some stage during the search the searcher has to decide whether it is worth continuing the search any further, or whether it would be better (i.e. more cost-effective) to print out the references retrieved up to that point. In making this decision the searcher has to weigh up a number of factors:

(1) The extent to which the search has focussed on the target area, at that point during the search.
(2) The cost of the search, if it is stopped at that point and a certain number of references is printed.
(3) The effect on the first two factors of continuing the search, either in order to refine it or to broaden it.

The first factor can only be determined by the user or, if the user is not present during the search, must be left to the searcher's own judgement. The second factor may, at best be estimated, on some systems. For example, on Dialog the 'cost' of the search can be displayed at any time if required; however, it is given in US currency and does not include the telecommunications charges (except for Dialnet). The third factor is much more intractable, because it requires the searcher to make a judgement based upon recall and precision on the one hand, and the cost of the search on the other. If the searcher decides to broaden the search, i.e. increase the recall, this will increase the search time and the number of references retrieved, and the cost of the search will rise. If the searcher decides to refine the search, i.e. increase the precision, some relevant references may be missed, and furthermore, the reduction in cost achieved by eliminating 'irrelevant' items may not outweigh the cost incurred by the extra time spent online.

It is the purpose of this paper to present a model, which is based upon the search time and the number of references retrieved, that will enable the searcher to calculate the total cost of the search at any time during the search. Furthermore, it should also allow the searcher to estimate the effect, on the total cost of the search, of spending more time online and of printing more or less references. Consequently, the model should assist the online searcher in making the search-or-print decision referred to earlier. Nevertheless, it should be stressed that this is not meant to imply that this decision should be made on grounds of cost alone.

2. Analysis of search costs

The cost of any online search can be broken down into a number of basic component costs:

(1) Operating costs:	the costs involved in setting-up and operating the service, e.g. equipment, subscriptions, rentals, training, manuals, etc.
(2) Staff-time costs:	general administration, pre-search interviews, running the search, and post-search liaison.

(3) Time-dependent search costs: computer access and telecommunication costs.
(4) Print-dependent search costs: references printed offline or typed online.

For the purpose of this analysis the first two components can be ignored. If they need to be included in the total cost, for charging or accounting purposes, an average cost per search can be calculated from the previous year's figures. In practice, then, there are just two component costs attributable to each search: the time-dependent and the print-dependent costs of the search.

To produce a model on which the search-or-print decision can be based, it is necessary to calculate the costs of the various operations that make up the search for the particular database and host under consideration. As an example, this calculation has been carried out for a search performed on the CHEMABS database mounted on the ESA-IRS system, and accessed from Cardiff through the ordinary telephone network (PSTN) to London and thence through Euronet to Frascati.

TABLE 1. *Analysis of search costs for CHEMABS on ESA-IRS*

Time-dependent operations	*Cost per minute (pence)*
1. PSTN call from Cardiff to Euronet node in London	15
2. Euronet call from London to Frascati	4
3. Access to CHEMABS on ESA-IRS	62
Print-dependent operations	*Cost per reference (pence)*
1. Print references offline	15
2. Type references online	6

In this example all costs include VAT and have been rounded up or down to the nearest penny. It should be noted that the cost of the Euronet call includes an element for the average number of segments transmitted per minute. In practice, examination of our own accounts shows that the cost of Euronet calls varied from about 3.5 pence per minute to 4.25 pence per minute over the year, but the variation for individual searches is likely to be insignificant in terms of the overall cost of the search, unless for some reason there is an abrupt change in searching patterns. Finally, the cost of access to CHEMABS and the print costs are based on the value of the International Accounting Unit for 1982, i.e. £0.53982. A similar calculation for Dialog would need to take account of the exchange rate for the dollar.

For this particular example, then, the total cost per minute for accessing CHEMABS is 81 pence, whilst the cost per reference printed offline is about 15 pence. From this, it is easy to establish a relationship between the search time and the number of references printed offline, in terms of their respective costs. For instance, the cost of 5 minutes online is equal to the cost of printing

27 references offline, namely £4.05. In practice however, this equivalency between the search time t and the number of references n printed offline has to be expressed for a range of values, as shown in Table 2.

TABLE 2. *Equivalency between search time and number of references in terms of cost, for CHEMABS on ESA-IRS.*

Search time t (minutes)	*Cost c (£)*	*Number of references n*
1	0·81	5·4
5	4	27
10	8	54
15	12	81
20	16	108
25	20	135
30	24	162
35	28	189
40	32	216
45	36	243
50	40	270
55	44	297
60	48	324

The table shows the cost of searching for t minutes or printing n references offline. In an actual search, however, the searcher will want to know the cost of some combination of search time and references printed offline, and the equivalency table can be used as the basis for these calculations.

3. Graphical representation of the model

To achieve the required model it is sufficient to notice that, for a given maximum search cost, about 5½ references less can be printed offline for every minute spent online, if the searcher is to stay within the financial limits imposed on the search. To make this clearer Table 2 can be reconstructed so that it shows the relationship between t and n for a range of values that give a total search cost of, say, £40. The results are shown in Table 3.

In other words, for a maximum cost of £40, after 5 minutes searching the searcher can afford to print 243 references, but after 30 minutes searching the searcher can only afford to print 108 references and still stay within the financial limit set on the search.

Obviously, tables similar to Table 3 can be drawn up for various values of c_{max} that the searcher wishes to impose on the search. However, this tabular form is rather cumbersome and it would not be practicable to use it for a range of values of c_{max}. It can be simplified, though, by plotting a graph of n against t for the range of values given in Table 3. This graph is shown in Figure 1. Using a setsquare it is easy to read off from the graph combinations of n and t that give a total cost of £40 at any time during the search, as shown in Figure 2. Furthermore, it is simple to construct similar graphs for

TABLE 3. *Relationship between search time and number of references for a maximum cost of £40, for CHEMABS on ESA-IRS.*

Search time t (mins)	*Number of references n*	*Search cost c_{max} (£)*
0	270	40
5	243	40
10	216	40
15	189	40
20	162	40
25	135	40
30	108	40
35	81	40
40	54	40
45	27	40
50	0	40

a whole range of values of c_{max} once it is noticed that, for a given value of c_{max}, the intercepts of the graph on the n and t axes are given by Table 2. Thus, for c_{max} = £40 the t intercept is 50 and the n intercept is 270, whilst for c_{max} = £24 the t intercept is 30 and the n intercept is 162. As a result, a set of parallel graphs representing a range of values for c_{max} can be drawn, if required, as shown in Figure 3. Similarly it would be possible to draw comparative graphs of n against t, for some fixed value of c_{max}, for the same database on two different hosts. However, there would be some danger in such a comparison if the structure of the database differed between the two

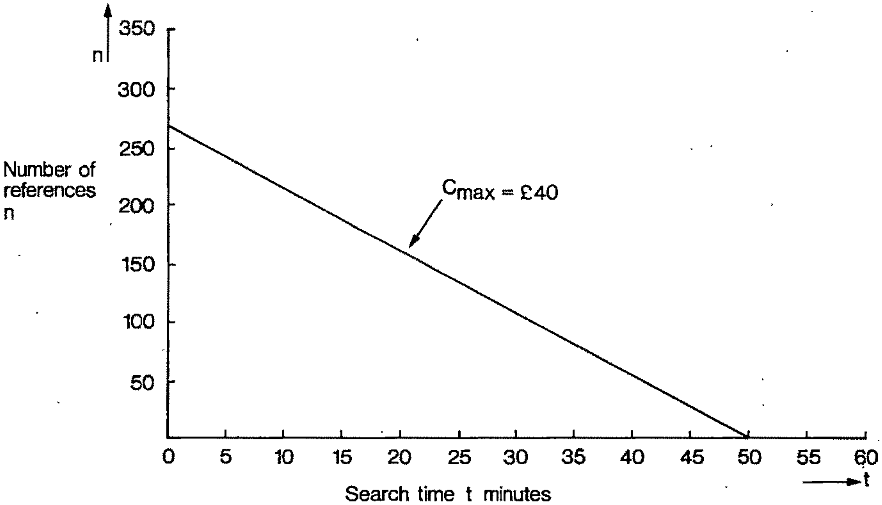

FIG.1. *Graph of the number of references n against the search time t for CHEMABS on ESA — IRS*

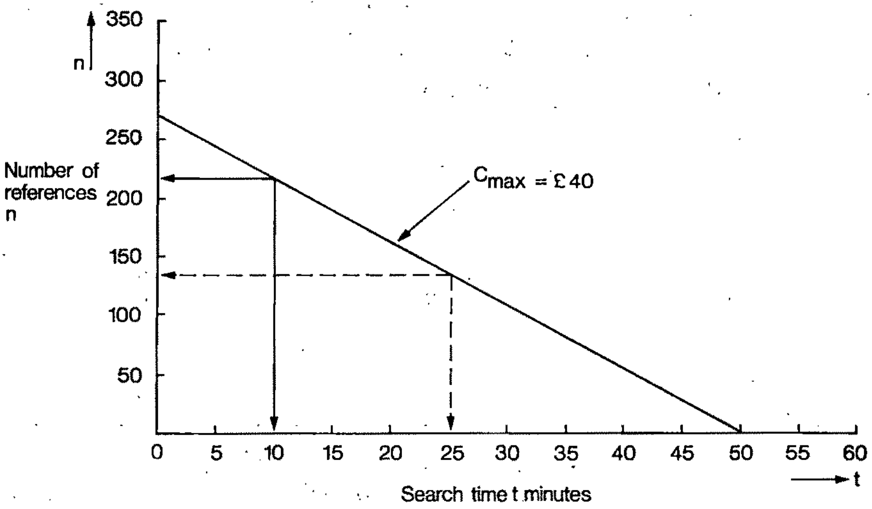

FIG.2. *Different combinations of n and t for C_{max}=£40*

hosts; for example Chemical Abstracts on Dialog is split into 5 files and until recently, contained more information than Chemical Abstracts on ESA-IRS so a comparison based solely on cost would be misleading.

4. Algebraic form of model

The relationship between n and t as shown in Table 3 and Figure 3 is a simple linear one that can be expressed in the form:

$$n = -rt + k(c_{max}) \qquad \text{(Equation 1)}$$

Here, $r = \frac{c_t}{c_n}$ is the ratio of the cost per unit search time to the cost per reference, and it has a negative value because the number of references that can be printed for a given c_{max} decreases with time. The value of r, which will be called the database coefficient, depends upon the particular database being accessed, which host it is mounted on, and the telecommunications system(s) it is accessed through. The other quantity k is determined by the value of c_{max} chosen by the searcher. In terms of the graphs shown above, r is the slope of the graph and k the intercept of the graph on the n axis. The values of r and k can easily be calculated from the graph. For both of the graphs in Figure 3, for example, r = 5.4 (c.f. line one of Table 2); whereas for c_{max} = £40 and c_{max} = £24, k takes the values k(40) = 270 and k(24) = 162 respectively. The equations of the graphs in Figure 3, then, are:

$$n = -5.4t + 270 \qquad \text{for } c_{max} = £40 \qquad \text{(Equation 2)}$$
$$n = -5.4t + 162 \qquad \text{for } c_{max} = £24 \qquad \text{(Equation 3)}$$

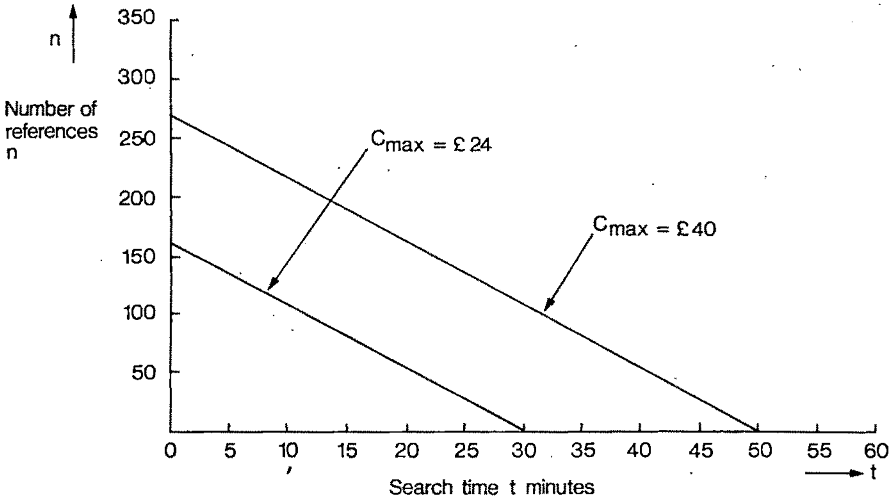

FIG.3. *Graphs of n against t for different values of* C_{max}

5. Matrix representation of the model

Using a setsquare and a set of parallel graphs similar to those shown in Figure 3, but including more values of c_{max}, it would be possible to determine at any time during the search the cost of printing a given number of references. However, this prospect probably would not appeal to most online searchers. Fortunately, it is possible to present the data in the form of a matrix that displays the relationship between the search time t and the number of references n printed offline for a range of values of c_{max}. The matrix can be constructed by reference to the values of t and n given in Table 2, and is shown in Figure 4. The value of each cell in the matrix represents the total cost of the search c_{max}, and is simply the sum of the costs of the search time and the number of references to be printed. The symmetry of the matrix makes it easy to construct, once it is noticed that the bottom row and first column duplicate the values of the middle column in Table 2, except for the first two values.

6. Conclusions

A simple linear model has been developed that relates the online search time and the number of references printed offline to the total cost of the search. The model can be represented graphically or in the form of a matrix, as the searcher requires.

The prescription for setting up the model for any database is straightforward:

(1) Analyse the search costs for the database, as in Table 1.
(2) Construct the equivalency table for the database, as in Table 2.

(3) Using the equivalency table, draw the graph(s) that correspond to the maximum cost(s) of the search, as in Fig. 3.
(4) If the graphical form is not convenient, use the equivalency table to construct the matrix of search costs, as in Fig. 4.

The model described above should assist the online searcher in making the search-or-print decision, and allow the searcher to stay within any financial limits imposed on the search. One simple way of reducing online search time and thus the cost of the search would be to use a microcomputer to store and edit the search strategy. This would dramatically reduce the amount of online typing needed and the references could be printed online directly onto disk, if required. Descriptions of such systems are starting to appear in the literature (2,3,4). As the model described above is fairly simple, it may be possible to program it into such a system in such a way that the microcomputer could also be used to monitor the search costs online, without recourse to graphs or matrices.

Number of references n	5	10	15	20	25	30	35	40	45	50	55	60
324	(52)											
297	(48)	(52)										
270	(44)	(48)	(52)									
243	(40)	(44)	(48)	(52)								
216	(36)	(40)	(44)	(48)	(52)							
189	(32)	(36)	(40)	(44)	(48)	(52)						
162	(28)	(32)	(36)	(40)	(44)	(48)	(52)					
135	(24)	(28)	(32)	(36)	(40)	(44)	(48)	(52)				
108	(20)	(24)	(28)	(32)	(36)	(40)	(44)	(48)	(52)			
81	(16)	(20)	(24)	(28)	(32)	(36)	(40)	(44)	(48)	(52)		
54	(12)	(16)	(20)	(24)	(28)	(32)	(36)	(40)	(44)	(48)	(52)	
27	⑧	(12)	(16)	(20)	(24)	(28)	(32)	(36)	(40)	(44)	(48)	(52)

Search time t minutes

FIG.4. *Matrix of search costs for CHEMABS on ESA — IRS*

AUTHOR'S NOTE

Throughout this paper it has been assumed that the references retrieved are printed offline. If there is a charge for online typing as well on the database, this will not affect the model provided that either the number of online types is small compared to the number of offline prints, or all printing is done online. The costs in Table 1, on which subsequent calculations are based, were derived from telecommunications and host charges applicable in July 1982.

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Prestel in a medical school library: the experience of the Welsh National School of Medicine

Anne Bell

Welsh National School of Medicine,
Cardiff

An account is given of the first year's experience with Prestel in the Welsh National School of Medicine Library. Statistical information is presented for usage of Prestel over a three month period when the service was well established and in frequent demand. This includes details about users and their reasons for consulting Prestel, and an analysis of the costs of operating the service. Conclusions about Prestel's value as a library service are drawn in the light of this, together with a small number of completed questionnaires. It is concluded that although users generally were enthusiastic about Prestel and found it easy to operate, from the librarian's point of view the service has been expensive and the information retrieved has not been of great value.

Background

CONFIDENTIAL INFORMATION for the medical profession is supplied by several Prestel Information Providers. In June 1982 the following IP's were offering a special service to doctors: BMJ/Glaxo Laboratories, MSD, ICI, Meditel and Wellcome Laboratories. The material offered includes drug information, case studies in clinical medicine, advice on managing a general practice, information on books, courses and conferences and details of job vacancies. The Welsh National School of Medicine (WNSM) Library is taking part in a scheme sponsored by Glaxo Laboratories to make the confidential service as widely available to doctors as possible.

WNSM Library has some 2,200 registered members. These comprise three categories of library user in roughly equal proportions: School staff and postgraduate students; Hospital staff; and Undergraduate Medical, Nursing and Dental Students. Currently the library has 16,000 books covering all aspects of medicine and nursing and over 28,000 volumes of journals. In the session 1981–82 nearly 22,000 loans were recorded. The Prestel service is freely available to all library users and no restrictions have been imposed on the length of time users are connected to Prestel or on the type of information sought. Those who ask to use Prestel simply sign for the keypad and then operate the system unsupervised, unless they ask for assistance from library

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staff. They are also requested to complete a short questionnaire intended to help us evaluate Prestel as a library service. The Prestel set has been placed in a prominent position in the library, where most users would pass it in the course of their regular library activities.

Notices on the wall behind the set explain what the confidential service to doctors offers. Detailed guides have been prepared to inform users about Prestel in general and the specialised medical information in particular. A simple set of operating instructions is given to each user who signs for the keypad.

In June 1982 Prestel had been operational for 9 months: it was thought to be a suitable time to take stock of the service and draw some conclusions about its role in the library. Information about users and usage is drawn from two sources: firstly the completed questionnaires, only 40 of which were returned during the period October 1981-June 1982; and secondly from the records obtained by requesting users to sign for the keypad. The number of returned questionnaires is disappointing and obviously not a particularly sound basis for statistical analysis. This lack of response from the users to some extent reflects the way in which the library has treated Prestel in its first session. Other than a paragraph in our Library Guide, no serious attempt has been made to publicise Prestel or promote its use (though for regular library users its location makes the service self-advertising). A shortage of staff and time has made it impossible to adopt a more active approach. This first assessment is, therefore, very much a preliminary one. Some interesting points can however be made at this stage and it is hoped that more information can be collected on which to base a fuller evaluation for the coming academic session.

Usage of Prestel

The number of returned questionnaires (40 over a 9 month period) is not a reliable indication of Prestel's popularity. Actual usage of Prestel has been much greater: in April, May and June, a period covering 60 weekdays on which the library was open, Prestel was used 130 times. As this represents an average rate of usage of twice per day, it is clear that Prestel did have an impact as a new library service. Those completing questionnaires were asked to record their start and finish times. The mean average time spent using Prestel was 20 minutes, the extremes being 10 and 45 minutes respectively. From the time charge component of our Prestel bill for the period April-June 1982 it is possible to estimate that the average time spent with Prestel by each of the 130 users was 27 minutes. (Total connection time would also include usage by library staff; this would be fairly insignificant during the three month period under discussion, all members of staff having familiarized themselves with the system already).

Prestel users

The overwhelming majority of Prestel users were undergraduate medical students: these account for nearly 75 per cent of completed questionnaires and 85 per cent of those signing for the keypad. Prestel therefore had little impact upon other regular library users. There has been no recorded usage by General Practitioners or other doctors following postgraduate courses, who are occasional rather than regular library users. This is despite the fact that some of the medical information is particularly aimed at GP's and those preparing for postgraduate examinations. Further, although no systematic attempt was made to promote the service, copies of all our leaflets about Prestel and the medical information were sent to the Department of General Practice and the Postgraduate Department.

Table 1 shows usage of Prestel by category of library user. Figures are also given for usage of other library services to enable comparisons to be made.

TABLE 1. *Usage of Prestel by Category of Library User*

Category of Library User	*Loans Session 1981–82*	*Photocopying Session 1981–82*	*Prestel Use April-June 1982*
School Staff	19%	59%	6%
Hospital Staff	25%	25%	9%
Undergraduate Student	56%	16%	85%

A lot of Prestel users subsequently returned to use the system again: the 130 recorded usages in fact only represent 68 unique users. This would seem to suggest that those who did consult Prestel found it to be a worthwhile experience.

Reasons for consulting Prestel

Information about reasons for consulting Prestel is only available for the 40 users who completed questionnaires. Nearly half of these (19) said that they were motivated by curiosity. Eight users were looking for 'travel information' and a further 8 wished to consult the medical information. The questionnaires are the only source of firm information about reasons for using Prestel (though these may not be totally relied upon in that users do not always give entirely honest replies: for example the library staff were aware that undergraduate users spent some time playing the games offered on Prestel—only one, however, referred to this in the questionnaire). Some further comments may be made, however, as a result of observation of users' behaviour. First, a certain amount of time was spent exploring the various games etc. available on Prestel until the novelty wore off. Secondly, a small but regular clientele developed for the locum job vacancies information supplied by *British Medical Journal.* Finally, consulting Prestel for travel information remains popular.

Users' experiences with Prestel

The questionnaires attempted to discover whether people found Prestel easy to use and whether they found the information they sought. In reply to the question, 'If you were looking for a particular piece of information, was your search successful?' over half the people who returned the questionnaire (21 out of 40) said that they were successful. We do not, of course, know how many of these users had a specific item in mind for which to search before using Prestel, and how many thought of something to look for while browsing through the system. The fact that so many users gave 'curiosity' as their reason for using Prestel suggests that the latter may commonly have been the case. This will have perhaps increased the chances of success, the user having gained an idea of the sort of information provided before deciding upon a topic for which to search. A further 11 users did not reply to this question, or indicated that it was not applicable. Only 8 of the 40 people failed to find the information for which they were looking. Similarly, 34 questionnaire respondents answered 'yes' to the question, 'Did you find Prestel easy to use?'

It was thought to be worthwhile to ask users specifically which aspect of Prestel they found difficult or unsatisfactory. Again, over half the questionnaire respondents (23 out of 40) indicated that they found nothing difficult. However a significant number of users (10 out of 40) were critical of the Prestel indexing structure, finding it a lengthy and slow process to arrive at the actual frame with the information. One other interesting point to emerge from the questionnaires is that 4 of the 5 users who were specifically interested in the medical information (as opposed to locum job details) were critical. It was felt that the content was too superficial and that there was simply not enough information to make the exercise worthwhile. One specific comment was that the programmed instruction in clinical medicine was 'too simple for hospital doctors'. In the case of product information supplied by pharmaceutical companies it was felt that this service would only be really useful if the number of drugs included were considerably increased.

The final component of the questionnaire asked users for any general comments about Prestel or its value as a library service. 16 of the 40 replies expressed unqualified enthusiasm and a further 15 made no comments. The remaining replies generally were favourable to Prestel but thought it would be more useful if more information were available in greater depth and the indexing structure improved. One user queried the cost of the service.

Costs

The total cost of the service for the three month period April-June 1982 has been calculated at £377. The components making up this total are given in Table 2.

By dividing this total by the number of recorded usages (130) it is calculated that each user has cost the library £2.90 while consulting Prestel.

Conclusions

Some positive comments can be made about Prestel in the light of our first year's experience. The service has attracted a lot of interest, and those who used it found it easy to operate. Generally, library users who consulted Prestel were enthusiastic about the service and thought it a worthwhile addition to the library. These points unfortunately are outweighed by a number of factors

TABLE 2. *Prestel costs April-June 1982*

Quarterly Prestel Bill (Frame charges and Time charges incl. VAT)		£218.00
Telephone Bill (estimated*)		£87.00
Quarterly Rental of TV Receiver (£238 p.a.)		£59.50
Quarterly Rental of special business line and jack plug (£50 p.a.)		£12.50
	Total	£377.00

* A separate telephone bill is not available.
Telephone connection time is known from the time charge component of the Prestel Bill. The figure given here is the cost of this time at standard rate.

which lead to the conclusion that Prestel has not yet made a worthwhile contribution to the library service:

1. It is disappointing that undergraduate students have been the only group of library users on whom Prestel has made an impact. This is in spite of its being reasonably well advertised to those who might have a special interest in the confidential medical information, and also despite its being well situated in the library.
2. The medical information has not been a success. It has attracted little interest and those who have consulted the medical pages have generally been critical.
3. It was believed when the service was first installed that Prestel could considerably enhance the range of reference sources which the library offers. However, the evidence available suggests that the information most often sought could equally well be found in conventional printed sources held in the library. The locum job vacancies offered by BMJ also appear in the journal itself. Travel information may also be found in conventional reference sources—train and airline timetables etc. It is true that at least one user observed that British Rail information on Prestel is presented in a more intelligible form than in the printed timetables, but on the other hand it is not as comprehensive.
4. The major reservation arising from our first year's experience with Prestel is the cost of the service. The £377 spent in the 3 month period April-June 1982 is unacceptable in the light of the small returns. To a certain extent our 'laissez-faire' attitude to use of Prestel has contributed to this problem.

   If we were to exert more control over usage of the service and restrict access to the pages deemed 'relevant' costs could doubtless be reduced. Another option would be to consider charging our users for the service. This would be a very notable precedent to set, however, and it is also relevant to wonder how many of our users would accept that they obtained £2.90 worth of information!

A preliminary assessment of our first year's experience with Prestel is therefore, something of a disappointment. In the new academic Session (October 1982-) it is hoped to encourage more doctors to come to the library to consult the medical information, and to complete questionnaire forms. All departments in the Medical School and Hospital are being sent copies of our leaflets about Prestel and the service will also be publicised in the Hospital Postgraduate Bulletin. Reaction this year from Undergraduate users has been a little more hopeful, in that several have consulted the medical information and found some of it valuable. The success of Prestel in a medical environment really depends, however, on an improvement in the quality and quantity of the information offered.

Information service models: some options, some choices

Bill Blake

Research and Information Consultant

Introduction

THIS ARTICLE IS the third to appear in *Aslib Proceedings* on the work of the EISSWA Research Project. (Experimental Information Services in two Social Welfare Agencies). The previous two[1,2] gave a resumé of the project's activities and began to examine factors which might inhibit effective service provision. This one, which forms one of the concluding chapters of the final report[3] submitted to the British Library in 1980, attempts to draw the projects findings together in providing some choices for the nature and content of information services; not only for social welfare practitioners, but for any organisation where information professionals are striving to meet their diverse customer needs.

Before developing the main argument it is useful to provide a brief reminder of the aims and objectives of the EISSWA project and its Action Research methodology.

The original research proposal for the project had the aim of assessing in detail the information requirements of a wide range of users and potential users of information services in the Social Services and Probation Departments. It was intended to operate a range and number of information services and to assess their value through feedback from users. This original research design reflected a number of different issues which had arisen out of previous research on Social Welfare practitioners.

Experimental services as a research methodology

The authors of the proposal felt that previous studies such as the INFROSS one had demonstrated that questionnaires and interviews alone were unsatisfactory as a method of ascertaining social welfare practitioners' information needs, since the interviewees experienced difficulties both in recalling specific needs and expressing them in terms of library and information services. By providing services to practitioners over a period of time it was felt that a more detailed and realistic picture could be built up. 'In the first instance, attention should be focussed upon the tasks and problems that users face in

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their day to day work; gradually these tasks and problems can be related to information requirements by users themselves, the library staff and the investigators.'

Personal contact with information officers

The proposal noted that practitioners preferred informal communication and were prepared to rely fairly heavily upon an intermediary between information resources and themselves. The Research Officers were seen as the key communicators of social welfare information to practitioners and also as an important motivating influence on them to seek out and use such information.

Improving access to social welfare information and literature

The research proposal considered that practitioners required *information* rather than documents. They had relatively little time or motivation for reading; but if suitably stimulated would sometimes be able to take account of information they judged important to their work. The role of the Research Officers was to answer queries and provide current awareness services which would make the social welfare literature more accessible to practitioners, and thus establish how such services should be packaged and organised by information services to achieve maximum response.

The EISSWA project was the first major social welfare research initiative conceived as a practical exercise in which experimental information services for practitioners could be devised and provided by staff who would have the dual role of Information Officer and Researcher. It was hoped that this approach would not only provide the personal element so prized by social workers and probation officers, but would also enable more of the social welfare literature to be made accessible to them. It was anticipated that findings from the three-year experiment would enable recommendations to be made on the provision of such services in the future.

This article is an attempt to present and consider such recommendations in the form of a number of options for the roles and skills of information staff. By drawing on the range of activities undertaken during the EISSWA project it attempts to suggest some propositions about the *types* of information needed by staff at various levels in social welfare agencies; the *nature* of these needs, and a consequent range of service models relevant to the resolution of some of these problems.

There is focus and discussion on *what* the problems and difficulties are; there is equally, and in our view more importantly, consideration of *how* the proposed models can be operated, including a qualitative view of their associated costs and benefits.

It is this wider argument that is addressed to the information profession generally rather than the narrower field of social welfare information.

The *how* side of the equation stems directly from the Action Research experimental nature of the EISSWA project as a whole with its stress on service definition, provision and review as a joint collaborative activity with our users.

In a sense it is an attempt to derive principles from our experiences of setting up and operating systems and services for the benefit of those who may wish to try similar models. It is an attempt to operationalise our experience for the benefit of others. In some ways it is a test for the research methodology of the project itself, since the very rationale behind this approach was to move away from user studies to user-oriented activities. This experimental, developmental model within an overall research framework was to provide a basis for establishing the parameters of appropriate, and workable information services. Although EISSWA, therefore, does provide further insights and knowledge on the *content* of the information needed within social welfare agencies, at the same time it has established a more detailed view of the roles, skills, and possible organisational structures within which these needs can be met effectively. It is these that are considered here.

Objectives/barriers and roles

As a means of addressing the issue of information service models, it is useful to place them within an overall conceptual framework, consisting of the three key elements of objectives, barriers, and roles (see Table 1).

TABLE 1. *Objectives, barriers and roles*

Objectives	*Barriers*		*Roles*
Improving ACCESS	(1) Lack of information	(A)	Current awareness
↑	(2) Lack of knowledge of services		↓
	(3) Physical isolation		Intelligence
	(4) Information overload	(B)	Research
	(5) Inadequate systems		'Consultancy'
	(6) Cultural distance/stereo-typing	(C)	Education
	(7) Lack of information skills		Training
	(8) Work pressures/lack of time		↓
	(9) Organisational climate		Development/ Change
↓	(10) Professional roles.		
Improving USE			

Objectives: Some of our activities have had as their objectives *improving access* to both new and existing information; others have been directed more towards helping social work and probation teams more effectively *use* the information they already possess. The two sets of objectives are not mutually exclusive. In the course of our work they overlapped, interrelated and were often indistinguishable from each other. In this context they have been perceived as opposite ends of a continuum along which a potential range of information service models can be arranged, not in any rank order but as a series of problem-related options.

Barriers: Having postulated this continuum, it is also possible to pose the concept of *barriers* which exist for access to and use of information. Two illustrative examples, both related to our work with teams, may clarify the argument at this point. Many staff in social work and probation teams find difficulty in keeping up-to-date with professional literature and developments. At the *access* end of the continuum this may be perceived as resulting from a lack of appropriate information, its resolution is the development of some form of abstracting service. At the *use* end of the spectrum it may be that the difficulties of access are overlaid and compounded by work pressures, aspects of the organisational climate, or a perception that keeping up to date is not in practice a key professional task. In this case the abstract service will certainly not be a sufficient condition for resolving the difficulties, it may also be an inappropriate form of service delivery.

Roles: The final element in the framework is a consideration of what information roles, and consequent skills, are necessary to remove the barriers which exist as we move along the continuum from *access* to *use*. This also includes discussion on the appropriateness of these roles to information work, and the implications of attempting to extend its sphere of competence into other areas.

The arguments put forward are not either/or ones, but are meant to reflect a series of options for existing and potential information services. The options themselves are set out here by focussing on some of the roles undertaken during the course of the EISSWA project, these are then linked to existing or potential barriers.

Service options

1. *Current awareness*

This has usually been the core function of many local government information services. Its forms include daily summaries of major newspapers, regular but less frequent abstracts of professional journals, and in some organisations manual or computerised SDI services. The *barriers* it seeks to overcome clearly relate to problems associated with *access*—a lack of information, a low knowledge of existing services, and problems associated with physical isolation from centralized information resources.

The content of abstract bulletins in social welfare implicitly assumes the importance within the professional task of keeping in touch with developments and research. Their length and structure reflect both assumptions, and the findings of previous British Library and other research about a lack of time for reading (INFROSS), a fragmented work pattern (INISS), and a need to simplify and make relevant existing research outputs.

We have argued elsewhere[1], however, that bulletins are often produced without adequate investigation of user needs, and may in fact be produced in spite of these needs because of cultural and organizational factors within the library profession itself. This is not to argue that all bulletins are bad bulletins; it *is* to suggest that wholesale distribution of a common information tool, in an organization as diverse and complex as Social Services, is likely to imply assumptions about a common need which do not do justice to reality.

A section of the Final Report to the British Library focusses on current awareness in describing two experimental services. One was a manual SDI service for a small group of senior Social Services management and advisory staff; the other involved the use of a bulletin format as a device for collating and sharing information on departmental projects within a Social Services department. Both provided some further insights into the role of 'current awareness' within social welfare agencies, and the appropriateness of these two methods of service delivery. The SDI service was positively received and relatively cheap and easy to operate. Its outcomes specifically support proposals of the INISS project for such a service to such staff (INISS p. 198).

The bulletin containing internal projects was less successful and casts doubts on the appropriateness of this format for this type of information. It did, however, suggest an alternative model for such information involving a more personalised service along the lines of the Information Broker experiment conducted in the Wessex Regional Health Authority.[4] In addition it provided a set of operational guidelines for those services wishing to establish any form of bulletin service. From both of these elements of the research programme the two important points are a recognition of differential needs, and a consequent tailoring of services to these needs. A third component is the importance of reviewing, and revising both content and structure in the light of consumer feedback—although we recognise the difficulties of obtaining such feedback without a higher level of personal contact.

This leads on to a consideration of the problem of the barrier of low knowledge of existing services noted earlier, to which frequent, regular bulletins are often seen as a possible answer. Whilst we did not undertake a specific evaluation of the publicity value of bulletins, we do have some spin-off evidence from our work with teams in Social Services, and Probation. This suggests that even where people received bulletins on a regular basis they remained unaware of the other range of services and resources available. This was backed up by the low level of use of the unit as a source of non-documentary information. Whilst this may be compounded by the problem of physical isolation, we came across many examples of staff in close physical proximity who made little use of the unit. In these circumstances one logical option is to increase the degree of personal contact between information staff and customers. Our experience would support the argument for a more personalised model of information work. But as argued later in this article, the roles envisaged are wider than those normally associated with 'being seen' *per se*. We argue for a more active involvement with potential clients on a much wider range of topics than purely current awareness. This includes some consideration of whether a centralized model of operation is the most effective and appropriate within social welfare agencies.

2. *Intelligence*

In response to the EISSWA project's Action Paper Number 1 (Inside Information) a chief Probation Officer suggested the importance for him of differentiating between *information* and *intelligence*:

> 'You don't seem to mention the distinction between "information" and "intelligence". Often I need intelligence, i.e. facts assessed and assembled in a way which helps me to understand a problem or dilemma more clearly, but I am merely provided with chunks of unrelated *information* extracted from work undertaken by other people for very different purposes.'

This, in many ways, is a logical development from an SDI service but would involve more than a profile of participants roles, talks, and consequent areas of interest. It demands not only that information should be filtered, but also that it should be structured in relation to the presenting problem. This was not a service specifically demanded during the course of the EISSWA project. It did, however, form part of our activities in a number of settings:

—Some of our individual queries involved precisely this research role.
—In our activities with a number of working groups we searched out, summarised, and made available information in a form related to a particular problem.

Within Social Services, as opposed to Probation, this role is already performed by a number of research and advisory staff. It was precisely some of these staff to whom the manual SDI service was successfully delivered.

Within the Probation and After Care service the current development of Information, Research, and Intelligence posts is a response to the need expressed in the quote from the Chief Probation Officer above. Our activities with probation teams have led us to speculate on these developments, and to question some aspects of their underlying rationale. In particular, whilst recognizing the needs of policy makers, perhaps more than other staff, for information of this type, we question the appropriateness of such developments to other parts of the organisation—especially decentralized teams, and residential establishments. The wider implications of the research—practice gap which underlie much of the perceived need for intelligence, and current awareness are considered in more detail later in this article.

So far, therefore, we have suggested that the roles and skills of information staff are normally directed primarily towards improving access to information and information services. We have said that this can be a useful and relevant service for some staff, but have implied that there may be other useful roles for information staff to perform. The first group of barriers considered below focus upon our findings, and those of project INISS that many of the problems within social welfare organisations are related to 'information overload' and/or a 'lack of systems'. The consequent appropriate information roles can be classified under the heading of 'Research/systems consultancy'.

3. *Research/systems consultancy*

The problems identified during the project and discussed here are still related to problems of information access. Much of the information needed, however, is not the research/current awareness material discussed above. It is instead legal, procedural and resource information needed primarily by what INISS calls 'operational level staff', particularly at fieldwork team level. Although as a research project one of our primary tasks was to investigate the types of information needed and the most appropriate methods of service delivery, we are arguing here that this would be an appropriate role for existing information staff. A summary of three aspects of our activities will serve to illustrate both the nature of the problems encountered and the tasks undertaken:

—In one Social Services area office we undertook a survey of the flow of material from all sources to the director and team leaders as a first stage in helping with a problem of information overload. Data from this was used to diagnose the problems, and devise and set up an area-based storage and retrieval system.

—A Social Services intake team had over time built up an embryo information bank. We were asked in to re-design and develop it as a collaborative venture into a larger and more widely accessible resource.

—After working with one probation officer helping him deal with his information storage and retrieval problems, his prototype system for incoming circulars was developed into a service-wide probation index.

In these and other examples it is important to define more clearly aspects of what we mean by the term 'consultancy'. The important components are those of the Action Research model itself *viz*:

—It is a collaborative relationship between the problem owner and the problem solver.

—There is an emphasis on establishing a process of engagement encompassing diagnosis, trial solution, data gathering, and re-assessment.

—The 'expert' must be willing to negotiate his or her skills in order to devise systems which are appropriate to the user, rather than technically optimum.

Thus many of the systems we eventually developed were technically relatively simple, involving low levels of technology and low levels of information skills such as indexing. They were, however, culturally appropriate for our users and led to systems which worked in practice. This was both a de-centralisation of the information role in that it freed us from sole reliance on our central location and resources, and also led to a development of decentralised systems and resources. Rather than utilising our existing knowledge and skills to organise and exploit information on behalf of others the 'systems consultant' role turned these skills outwards towards our customers. They were used to help them organise and exploit *their* information. This helped our clients make more effective use of existing information, it also involved some education and learning about the potential of information as a resource. It also leads the argument into the *use* end of the objectives continuum, and to a consideration of the potential development of *consultancy* into 'education, training and development'.

4. *Education, training and development*

The third group of *barriers* considered here are perhaps the most difficult to both identify and resolve. They can be loosely classified as *organisational.* They are difficult on at least two levels:

—the scale of effort needed to remove them may be much larger than those at the access end of the spectrum.
—they may appear out of bounds for information staff because they may not appear intrinsically to be 'information problems'.

They may, however, be the most critical ones in establishing and developing effective information services on both a centralised and de-centralised basis. The following considers a selection of these encountered during the EISSWA project and outlines some of our activities aimed at overcoming them:

(i) Cultural distance/stereotyping: For librarians this can take two forms; labelling user groups as 'social workers', or 'probation officers' in a way that is too simplistic in providing services because of differential/varying needs of users. As project INISS stresses information need and consequent services have to be closely geared to roles, tasks and experience. A second form of stereotyping is summarised by Oldman— ' . . . they view the user to be an untrustworthy character to be consulted when information services are being constructed'.[5] Consequently services are designed on the professional's assumptions and estimates of their needs. The user's rejection of some or all of the services offered merely serves to confirm the stereotype and locate the failings with 'them' rather than 'us'.

At the social work end of the spectrum, particularly at team level, the very organisational structure within which the potential user operates serves to operate as a barrier to the use of outsiders. Our experience of the strength of the desire for team-located systems is confirmed in a recent study of social work teams—'Social Service Teams: The practitioner view'. Although referring to use of advisory staff at headquarters their conclusions are equally relevant to most out-of-team resources:

> 'It seemed that two related ideas influenced the attitude to consultants. One was a feeling that the teams should be self-sufficient and the other that when social workers needed help they needed it immediately and from someone they knew and trusted. The idea that teams should be able to meet the needs of their members and their area was strongly and widely held, as was the belief that the necessary expertise was available in the teams.'[6]

(ii) Lack of information skills: is often put forward as a barrier to using existing services and systems. The corollary of this is that it is necessary to 'educate the user'. This may be undertaken as an important element within, in this case, a social worker's professional education. It may take place as part of an induction process, or as an element in the courses offered in post-qualification, in-service training.

It is useful to examine this barrier to use through differentiating *knowledge* and *skills*. Although much of the literature on user education refers to information skills—using indexes, knowing appropriate sources, using bibliographies—it is in many circumstances talking about knowledge built up by information officers over a period of professional practice, that is through experience. The two primary areas of skill in information work lie in making judgements on how the physical material should be organised, and *how* to interact effectively with users.

For social workers most of their primary skills lie in the interpersonal rather than technical area. They are in one sense a mirror image of the information profession. It is interesting to note here the interest in community information services in increasing librarians' skills in precisely these areas:

> 'I believe that librarianship could learn from the sort of training courses given to counsellors, which include training in interpersonal communication techniques. This would provide a balance to the emphasis given in librarianship training to the importance of documentary resources.'[7]

The implication of these factors is that both the suggested content of much user education, and the formats used (e.g. courses on how to use library systems and sources) may both be inappropriate in this context.

Our activities would suggest that many social workers have highly developed skills in finding out information from other agencies and people through continued contact, liaison, and negotiation with DHSS, Housing Departments, voluntary agencies and so on. What they often lack are appropriate resources and systems, and some relatively basic knowledge and skills in organising material they acquire.

An important role for information staff, and perhaps a primary role within this organisational context, is that of education/training in both a continuing and discrete sense. On a continuing basis the types of consultancy function described in the previous section represent one element in this role. On a more general level the actual process involved in setting up our other services, such as SDI and bulletins, with their stress on review and re-assessment are part of a total education/learning process.

In a discrete context some of our activities involved us in specific training/educational courses:

—We became involved with residential workers who were undertaking some group project work as part of a one year, day-release course at a technical college. Our role and task was to use their project work as a basis for broadening their information knowledge *and* skills.

—We participated in a course at Bath University for a group of senior social workers. The task here was to focus on their roles as managers of information in the context of their team. This was accomplished through use of experiential exercises and simulations.

—We set up and ran a series of time-limited, team based training events within the Probation Service entitled 'Access to and use of information'. They involved the teams in working on an agreed task using available and new information. The aim was again to increase their knowledge of the range of available information, and the skills in organising and exploiting it.

Overall, therefore, much of our work has had an educational/training focus, but one with a number of important features:

(i) The activities were experientially based so that *information* was considered and learnt about in a contextual environment. This was true even on training courses where we used available group exercises, and developed others to meet our needs.

(ii) A primary aim was to develop the capacity of social workers, and probation officers to help themselves to information, and to become independent.

(iii) The training raised issues related to the much wider issues of organisational communication e.g. trust, organisational climate. Whilst not pure information issues they are fundamental to an understanding of information and its use or underuse in social welfare organisations.

This last point leads on to a consideration of a final group of barriers to the effective use of information and consequent appropriate solutions.

(iii) Organisational climate, trust:

> '. . . time alone did not ensure that social workers recognised expertise in others. We discovered, at one feedback session, that certain team members had not thought of their team leader as someone to consult about deaf clients until they read in our draft report that he was trained as a social worker with the deaf.'
>
> 'I think if you need support you need it there and then. It needs to be someone you know and trust . . . instead of going to regional headquarters into an alien situation with people you don't know and who don't know your area or the pressures.'[8]

These two quotes illustrate two examples of the impact of the existing organisational structures of social services departments on the behaviour of workers at team level. Whilst the team structure and its cultural strength act as barriers to the use of outside personnel, especially those at headquarters, it does not guarantee the optimum use of resources within the team.

In terms of two elements of high priority information need at team level these factors have a significant effect upon their practical availability.

—local resource information and expertise although available within the team is seldom shared effectively. This is partly due to the strength of the preference for informal channels, but also because of the lack of explicit status given to information as a problem at team level.

—Information on the existence, quality, and availability of out of County residential resources is held internally by advisory staff at headquarters. Its availability to social workers is severely constrained by the lack of knowledge and trust noted above. The prime source of information in theory becomes in practice a 'lender of last resort'.

The interaction of organisational factors and information need reinforce each other, and also have a significant effect upon the use of literature oriented information services. At team level this can be illustrated by postulating on the basis of our activities and the existence of a hierarchy of needs. (See Fig. 1.)

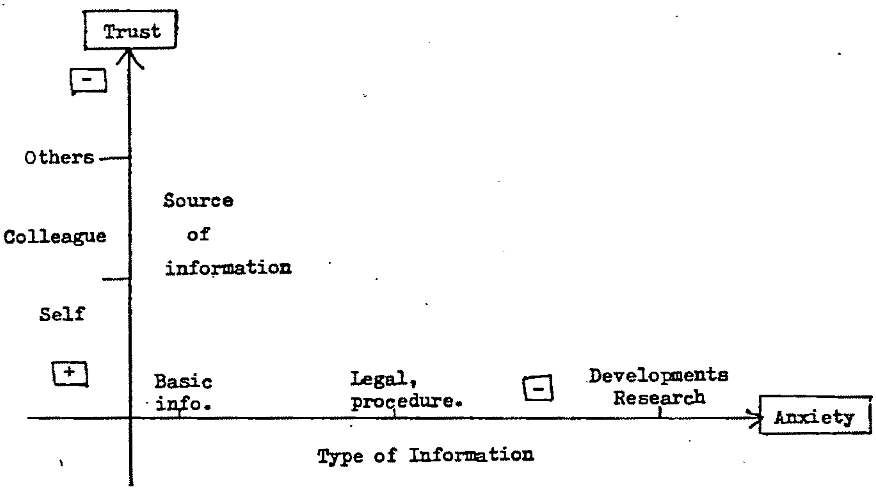

FIG 1. *Hierarchy of information needs*

Basically information which is needed quickly and often, and is client specific tends to generate a higher level of anxiety, it is consequently obtained from personal resources or from close colleagues. Information on issues such as research and developments create a lower level of anxiety and therefore a trust relationship is a less necessary component in the range of potential sources. The outcome is that information units, if they are used at all, are not used for high priority information. The more information staff can become involved with high priority issues, the greater the trust relationships and potentially the more effective they can become in bringing about change within the social welfare agency related to both access to and use of information.

Resumé

The main argument running through this article is that if information professionals believe that social welfare organisations and their staff can be made more effective by explicitly considering the ways in which they acquire and use information; *then* one is faced with the reality that this acquisition and use is affected by a wide range of organisational factors. The corollary of this is that depending on towards which end of the *Access—Use* continuum units choose to operate, so the associated range of knowledge and skills will change. From material oriented skills at the information provision end to interpersonal, research and training skills at the other; and from a knowledge of sources and subject fields to a knowledge and understanding of how organisations operate in general and how a particular client agency functions in particular.

This is not to understate the potential difficulties in taking on some of these options. In recognising as a project the problems involved in changing information policies within social welfare agencies, we need also to recognize barriers to change within the information profession.

Some problems

Accountability:
As a research project we were outside the usual accountability framework of either the social welfare agencies, or the library system. This gave us a wide freedom of action in both how we operated, and the issues on which we worked. Together with relatively easy access to staff and groups at all levels it gave us opportunities which would be difficult to replicate easily within a local government framework. Having said this we would suggest that non-agency staff, or outsiders who have both a knowledge of social welfare, and a stance of offering help with important issues can be better placed than 'in-house' units. The library base may, therefore, have some positive elements for the envisaged activities.

Conflict with other support services:
During the project we attempted to maintain close liaison with social welfare training and research staff. In some cases we were involved at the same time with the same staff groups. This made it important to clarify our respective roles—which on these occasions were different. As we state in the main report, however, there were occasions when what we did was indistinguishable from what the research or training section would have done—except that our final aim was specifically concerned with information need.

In some cases there were expectations generated, especially in the early days of the project, that we would become involved in the general issues of management information systems. Whilst this was an important, and in some cases an overriding need, it was one excluded from our original research brief.

It is impossible to set down clear guidelines on how to resolve these conflicts; what we can do here is attempt to make people aware of their existence and the consequent need for continuous liaison and negotiation. It is also perhaps useful to point out that in social welfare agencies social workers themselves are frequently involved in areas involving role conflict and its resolution, with other agencies, e.g. police, G.Ps., hospital consultants.

Professional identity:
In suggesting that staff currently involved in 'information work' should both extend, or perhaps change their roles, and operate in a less defined area raises issues of professionalism and professional identity. We seem to be asking library/information staff to give up one 'profession', but take on a myriad of others. We are not alone in doing this—a number of recent commentators have suggested a range of changes for the library profession:

—From 'Librarianship to information management' (Leslie Wilson)
—From 'Librarians to Community information workers'. (Judith Bowen)

Others have suggested that librarians should develop skills as 'counsellors' (Barnes), 'information brokers' (Valdez), 'intermediaries' and 'facilitators' (Lester).

The important element within all of this is that there appears to be an underlying perception of the need for some change if the profession is to both survive and develop. The need is for evidence on the appropriate direction of change, the reasons for it, and the potential costs and benefits for both the information profession and current and prospective customers. The options considered here together with the main chapters of our Final Report are an attempt to do this within the context of social welfare agencies, but with implications for any or all of us in the information business.

AUTHOR'S NOTE

Enquiries about the EISSWA project should be addressed to: Bill Blake, Research and Information Consultant, 11, Redpit, Dilton Marsh, Westbury, Wilts. Telephone: 0373 864203.

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Measuring a library

P. G. Peacock
Stirling University Library

A method of estimating occupied shelf space in a library is described and the level of accuracy obtainable is discussed.

FOLLOWING PUBLICATION OF the Atkinson report[1] British university librarians have been required by the University Grants Committee to complete an annual questionnaire designed to collect information on library accommodation and stock. Among other things, the questionnaire seeks data on the length of occupied shelving in metres for various categories of library materials. Critics of the questionnaire have rightly pointed out that analysis of the use of library space based on nothing more than the linear measurement of shelves is quite inadequate[2]. This paper is not concerned with that issue, important though it is; but accepting that there may be some value in expressing a library's size as a linear measure it examines a method that may be used for this purpose.

Measuring a library can be a costly exercise. The survey conducted at the library of the University of Newcastle-upon-Tyne[3] in 1971 was estimated to cost between £1,500 and £2,000 (roughly £10,000 at 1982 values). At Newcastle there was a particular need for accuracy, and the major part of the work was entrusted to a firm of professional quantity surveyors. Measurements were made to the nearest millimetre, and accuracy over the whole collection was claimed to be ± 1%. There is relatively little expense to be saved by accepting a lower standard of accuracy: measuring to the nearest centimetre is not markedly quicker than measuring to the nearest millimetre. Whatever the standard of accuracy, it is in the act of *measuring*, one by one, tens of thousands of shelves that the cost lies.

The process can be greatly speeded if the amount of occupied shelf space is estimated rather than measured. The method used at Stirling University Library is briefly to inspect each shelf, noting whether it is full, three quarters full, half full, one quarter full or empty. The status of each shelf is entered into a hand-held calculator as 1, 0.75, 0.5 or 0.25. At convenient intervals (the end of a range or section of the classification) the total of full equivalent shelves is converted to metres. By this method it is possible to maintain a slow but steady movement along the shelves. One person can inspect the 16,000 shelves in Stirling University Library and collate the data in about two days.

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A shelf counted as half full may be anything from ⅜ full to ⅝ full. A shelf counted as three-quarters full may be anything from ⅝ full to ⅞ full. For individual shelves therefore the accuracy of this method is no greater than ± 12.5%. Successive errors will tend to cancel each other out however with the result that the cumulative error over many thousands of shelves will be acceptable for all practical purposes.

Using a computer it is possible to simulate the process described above. The steps in the simulation are as follows:

(a) Assuming that the process is to be simulated for a library of 16,000 shelves, 16,000 random numbers between zero and unity are generated, each number representing the proportion of a shelf occupied by books.

(b) Each random number is examined and assigned one of five values as follows:

random number is	*value assigned is*
$\leqslant 0.125$	0
>0.125 and $\leqslant 0.25$	0.25
>0.25 and $\leqslant 0.375$	0.25
>0.375 and $\leqslant 0.5$	0.5
>0.5 and $\leqslant 0.625$	0.5
>0.625 and $\leqslant 0.75$	0.75
>0.75 and $\leqslant 0.875$	0.75
>0.875 and $\leqslant 1$	1

(c) The 16,000 random numbers are summed.

(d) The 16,000 assigned values are summed (simulating the process of entering estimated values into a calculator as described above).

(e) The difference between the sum of the random numbers (representing the true shelf space occupied) and the sum of the assigned values (representing the estimated shelf space occupied) is computed.

A loop causes the program to be repeated as often as required. Table 1 shows the results of the program run for twenty notional libraries each of 16,000 shelves. Column A shows the sum of the random numbers for each notional library. Column B shows the sum of the assigned values. Column C shows the difference between columns A and B. It will be seen that the largest discrepancy between true and 'estimated' shelf occupancy for twenty runs of the program is 45 out of 8,117 full equivalent shelves.

This simulation departs from reality in two important respects. First it is assumed that all 16,000 shelves are used, and that the distribution of books on them is entirely random. In a real library, of course, both for practical and aesthetic reasons some attempt is made to keep the porportion of each shelf occupied uniform. Again in a real library about half the occupied shelves would be filled to the limit of their capacity with runs of periodicals or monographs in series for which it is unnecessary to leave (at least *within* each sequence) any space for expansion. Both these considerations are arguments in favour of estimating rather than measuring. Clearly for any

TABLE 1. *Computation of the difference between true and estimated shelf occupancy for twenty notional libraries*

A	B	C
8038	8034	− 4
7982	7986	4
7995	7988	− 7
7973	7970	− 3
8028	8033	5
7954	7940	−14
7984	7993	9
7893	7897	4
8010	8002	− 8
8125	8122	− 3
7860	7889	29
8117	8162	45
7995	8001	6
8009	8028	19
7925	7914	−11
7957	7967	10
7952	7953	1
7991	7992	1
7954	7941	−13
7960	7951	− 9

sequence of shelves in which a uniform occupancy is adopted all that is required for an accurate total is to measure one and multiply by the number of shelves.

The superiority of measuring over estimating is more apparent than real. Accuracy in measurement is an elusive ideal, even when the measurer understands clearly what he is measuring and how he should measure it. Little public discussion has taken place on the conventions to be adopted in measuring a library. There is no self-evidently correct way of measuring non-book materials, items on loan, large folios shelved flat, unbound newspapers or periodical issues on display. Nor is it clear whether accuracy requires books to be measured as they stand on the shelf after a period of normal public use, or to be measured only after the library has been systematically tidied. Even light pressure applied to a row of books restrained at one end will usually reduce the space they occupy by a centimetre or two, so that a library systematically tidied before being measured will be appreciably smaller in terms of shelf space occupied than the same library measured as it stands.

It is a fairly common assumption that once a library has been measured all that is required to update the total is to add successive annual intakes to it. Löhmann[4] argued that a library need only be surveyed 'every ten or twenty years'. Experience at Stirling does not support this assumption. Adding successive annual intakes to the known size of the library in August 1974 produces in 1982 a total that understates the true size of the library by 1,000 metres. The following explanations can be offered, though it is not claimed that they are sufficient to account for the discrepancy noted.

(a) Aggregating many small measurements taken at the point of receipt is likely to produce an artificially low total, since the natural action of the measurer is to press the books being measured into a compact unit.
(b) After a period of normal use new books gradually lose the effect of compression exerted by presses during manufacture.
(c) The act of binding or reinforcing a paperback or unbound periodical volume may add several millimetres to its width.

If the discrepancy is the result of systematic errors of the kind described (rather than of avoidable carelessness on the part of the measurer) then it should be possible to compensate for them at the point of receipt. It must be doubtful however whether such compensatory adjustments could be very accurately or consistently applied; or whether in the long term the labour of applying them would be less than the labour involved in surveying the whole library at regular intervals by the relatively simple method advocated in this paper.

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Setting up a 'One-Man Band' library in a commercial environment

A. M. J. Perrott
Kings College, London

This article describes the preliminary stages of establishing a 'One-Man Band' library for a commercial marketing department, highlighting some characteristics of this type of information work. The 'One-Man Band' entity—which can be defined as a special library or information unit operated by one person—is well recognised as a type of service with its own features, and has been a topic of interest in library circles for some time.

IN 1967 THORNTON[1] EXPRESSED the need for One-Man Band (O.M.B.) co-operation and using Aslib as a co-ordinating body: he mentions in particular, with reference to his own field of the textile industry, the importance of liaison through Aslib groups and of utilising specialised external sources. A British Library Research and Development Department (B.L.R.D.D.) report of 1976[2] confirmed the high number of O.M.B.s—drawing on material from the 1972 DES census, it stated on p. 5 that 32 per cent of library/information units employ only one person, either full-, or part-time. Published descriptions have referred to a variety of library environments: King[3] has outlined an O.M.B. in an academic setting, describing an SDI service for electronic engineers, while Don Lee[4] has discussed his O.M.B. role in the public transport industry. Much of Lee's work requires forming contacts between managers and specialists in research, compiling surveys and preparing 'information field work', and providing complete information packages in reply to individual requests; he foresees the development of small information units operating away from a traditional office or library environment. Guy St. Clair[5] has introduced an American context for the O.M.B., describing some of the features of One-Man Band library work, its disadvantages and possible rewards, with reference to his library of the Union League Club, New York. St. Clair begins by emphasising the need for professional self-management, establishing one's priorities and concentrating efforts on essential tasks. He continues to elaborate a number of ways of ensuring communication between library and management clientele—through reports, daily briefing, written memoranda. The rewards of O.M.B. library work are summarised as a freedom from 'the harassing and political maneuvering that characterises many library positions', and the appreciation derived from 'an immediate interaction between the client and the librarian'.

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O.M.Bs have, more recently, provided a meeting-point for fruitful discussion between special librarians involved in this type of work. Over 20 O.M.B. librarians were present at an Aslib seminar in June 1982, which led to the identification of some O.M.B. problems and suggested solutions. A Steering Committee was founded to form an O.M.B. group, and B.L.R.D.D. expressed an interest in organising a research project into One-Man Bands. Since last June, the Steering Committee has met three times, produced one O.M.B. Newsletter, and at the meeting of the 26 Oct., formally resolved to establish a group, and decided on the constitution—the aim of the group being 'to hold meetings, to produce a newsletter, and to act as a pressure group for O.M.Bs outside the profession.'

This contribution to the study of O.M.B. libraries draws on my own experience of establishing a business information service over a period of ten months for a marketing department in the toy industry.

Introduction to Lesney Products' information service

At the time of my appointment as 'information executive' in October 1981, Lesney Products was still the largest European manufacturer of diecast model cars—though 'Matchbox' diecast was only one of the company's five established product ranges, the other four being 'diecast-related environments', 'electric track racing', 'kits' and 'pre-school' toys. There was then considerable confidence that the company would pull through a lean period experienced by the toy industry in general, an optimism reflected in the recruitment of several new members of marketing. Unfortunately, during the last year a variety of factors contributed towards the deterioration of company cash-flow and the receivers were brought in during June 1982. Members of marketing, including myself, sought alternative employment at this time.

The information service which I implemented for ten months did, however, function adequately and for long enough to gain the peculiar features distinctive to one person library work. Some fundamentals of the O.M.B. librarian's function, indeed, appeared more obvious as the library was forced to operate on a restricted budget, in an atypical commercial environment, and had to adapt to a variety of changing user needs.

My responsibilities were broad and demanded as flexible an approach as possible to duties. Principally, by my job description, I was 'to be responsible for the operation of an information library' as well as to provide a desk research facility and carry out data analysis for the marketing team and in particular for group marketing services manager, my immediate supervisor. My users were primarily the fourteen other members of the marketing department, though the service was also used by up to thirty others from the group management, finance, sales administration, design and development units of the company.

Library techniques: consultancy and co-operation

The first stages in my O.M.B. work were specific to my individual situation, since the appointment came as my first professional post and my first experience of commercial libraries.

Consultancy, i.e. receiving advice both from within and outside the company, was thus an important aspect of my work. Internally, consultancy began with a planned induction fortnight when marketing members gave me a general background to their own work and to the toy industry. Managers were always willing to explain, discuss, and to provide any printed information to help in my work.

I made contacts with many libraries outside Lesney since external library sources were drawn upon for general business information. The company became members of Aslib, which was used for consultancy on setting up a library, information enquiries, and online searching; Aslib also provided invaluable contacts with other small special libraries. Such links confirmed Thornton's statement:[6] 'From past experience I have found that one's own "difficult" questions are frequently common knowledge in another library'.

I visited, through Aslib AEBIG membership, libraries of the Advertising Association, and of Ayer Barker Ltd., while as a result of attendance at an Aslib seminar, a search against POLIS relating to the toy industry was conducted on my behalf. Lesney also took out a corporate subscription with the London Business School Library, a source for general company information, and for free access over a period to TEXTLINE. Other libraries commonly visited or contacted were, not surprisingly, the British Library Business Information Service, the City Business Library, the Statistics and Market Intelligence Library.

The wide European structure of Lesney's overseas trading operations required me to go beyond strictly U.K. commercial information. Several enquiries were forwarded to the Board of Trade Library and the information service of the European Communities Commission—the latter, for example, providing useful material on consumer legislation and toy safety standards.

General mechanics

The nuts and bolts of the service began with the arrangement of a wealth of material associated with marketing and the toy industry in seven four-drawer filing cabinets. Here were held many competitors' catalogues and price-lists, and various sources typical of a small special library—internal market research reports, product photographs, non-English language material, company information. Early problems included persuading individuals to sacrifice personal filing space, and keeping track of outgoing files. Users, however, quickly became familiar with new labels, and with the location of the best used material.

The second major task was re-ordering and accessioning periodicals. Incoming trade press was both inadequate and superfluous; at the same time as I collected user profiles, I conducted a questionnaire based on currently received journals which was also circulated to general management. The resulting list of required titles was ordered, and a small card index used to check accessions and circulation. Normal housekeeping activities, associated with use of files, distribution of trade press, were an ongoing part of all my O.M.B. work.

Current awareness services

Three types of current awareness service were introduced at an early date—a press cuttings service, a monthly bulletin, and an abstracting service.

The press cuttings service was formed from extracts of daily and Sunday papers on topics relevant to the toy industry and general economy, pasted under simple subject headings on a central transition board. Cuttings were changed regularly and a file kept of articles in series—e.g. the weekly 'marketing' report in The *Financial Times.* Selected articles most directly relevant to Lesney were incorporated into the 'U.K. press digest'—a two to three page bulletin on headed marketing department paper circulated to all group management and marketing. The same paper design was used for a monthly bulletin covering news of more strictly internal developments, issued from central marketing to European marketing teams: I collected information from product managers on any significant developments in the five product categories which could be made generally available to Lesney subsidiaries. Also appearing on a monthly basis and limited to marketing circulation was a news digest, designed to condense the large quantity of trade press facing product managers. Approximately twelve numbered abstracts including one occasional translation were taken of significant articles of interest from the month's journals, and the original articles were stored. The replies to the request form, attached to the numbered list, by which the user indicated which copies in full he wished to see, were easily incorporated into an SDI service.

Reports, desk research, and everyday reference inquiries

The first large scale report for marketing gave company information on major competitors, including details of company address, names of management and marketing personnel, notes on major products and brands, financial information on turnover and profit, details of overseas trade, and brand-share statistics. The two volume report was necessarily patchy: much required information was of a confidential nature, and published sources were found to omit current information on the many private companies in the toy industry sector. Other reports in this category included a register of brand names, and a summary of external market research publications relevant to the toy industry.

Shorter reports covered, for example, imports from the Far East, information on the electronic games industry, and other toy markets outside Lesney's traditional areas. One particularly interesting piece of work involved gathering historical facts, production figures and photographs for World War II commercial vehicles. Marketing services also required surveys—e.g. general company information on the retailing industry. Briefer reports, not supplied to a specific demand, included summaries of information resulting from POLIS and TEXTLINE searches, abstracts of photocopied material from other libraries of potential relevance to consumer markets. Towards the end of my working period, I provided Lesney marketing with our own library contents list and a summary of London business library facilities.

Everyday reference work included supplying company addresses, telephone numbers, some communication with overseas subsidiaries, and handling replies to letters from hobby fans. I was also expected to provide some 'relief work' for members of marketing—such as moving product samples.

Brief evaluation of the service

The services described above were generally well received, users reacting enthusiastically to unexpected items of desk research—for example to extracts from Mintel reports or to analyses of grocery outlets. The U.K. press digest and monthly bulletin became recognised channels of information dissemination and communication. Approximately one third of users did not return request slips to the three abstract journals issued, but the remaining two thirds who did asked for a minimum of two articles. Perhaps acknowledging that the service was still in embyro, users were grateful for retrieval that had more to offer in recall than in precision; though whatever the quantity, quality was expected in presentation and in keeping to a stated deadline. The service benefited from the influx at intervals of new employees to give an objective assessment of the library's effectiveness.

Problems encountered, and O.M.B. characteristics

The library service by no means developed without setbacks and hitches; the problems I met were those typical of special and O.M.B. libraries.

The open office environment, familiar in an industrial setting, was not necessarily conducive to the most productive service, and I was frequently under cross-fire from a barrage of conversations raging across the department. I tried to move away from traditional patterns of dealing with information, and found that attempts to impose a detailed business library classification upon the material on file met with suspicion and disapproval; some conventional methods seemed, however, essential, yet it was very difficult to persuade users to follow any 'library rules'—for example, to record their removal of a file. Many of the problems which I encountered were related to the subject content of the work: in particular concerning the difficulties of handling market research reports. Market share figures were frequently only obtainable through direct contact with competitors, any reports on the European toy industry had an astronomical price-label attached, and product managers, sceptical of the validity or currency of sources, expected me to act as research analyst as well as information provider. Problems of the availablity of market research information, particularly with reference to the possible co-ordinating role of the British Library, have been a subject for discussion in 1982 issues of Aslib AEBIG news in *Aslib Information*, and of the AEBIG seminar, on 25 May 1982.

More outstanding were those problems which can be seen as associated with O.M.B. librarianship. One difficulty was handling the sheer volume of material—during the first month my desk seemed to be floating above a sea of competitors' catalogues waiting to be filed. There was also a wealth of potential information that could be made available. King[7] has stated the need for O.M.B. libraries to understand carefully the users' working patterns in order to avoid irrelevance—one of the lecturers warned 'I don't want too much information'. The fear that the new librarian could so easily 'overdo it' was obviously evident in a busy marketing team where great value was already placed on a vast flow of internal correspondence. Some difficulties were those of maintaining a correct professional attitude. Disciplined self-management was required in order to keep the right priorities when organising one's workload. It was also difficult sometimes to preserve professional status—I would support St. Clair's[8] point, that the O.M.B. librarian can all too easily be overwhelmed by day-to-day tasks and let the professional service slide: after a day away from the office, the accessioning and circulation of trade press, and filing company information would become all-consuming. I often missed the traditional library environment where, whatever the pressure of work, one can at least be assured that some service will continue without constant demands on one's personal inventiveness and self-evaluation. It was important to retain professional contacts as well as to uphold a professional service: it was vital to communicate with other librarians, through attendance at seminars and by seeking advice from external sources, as mentioned above. Trying to admit defeat was painful: I could not answer all enquiries, and had to restrict the service to avoid becoming marked in the company as 'information man' and source of all knowledge.

Conclusions: recommendations for O.M.B. work

Selecting information, avoiding swamping users, maintaining a professional status, re-evaluating my work were necessary requirements. The most important qualities, however, which I would place as necessary for a successful O.M.B. library, as a result of my experience, can be summarised under three topics: multiple use of an information situation, user integration and ease and clarity of retrieval.

Under the first heading, I include 'best use of one's time.' The May 1982 Aslib seminar on O.M.B's identified one problem area as simply 'money, space and time'. Lack of space and money indeed created difficulties. Cabinet space was sparse, and periodicals piled in the corner as each product manager insisted on a complete run of his favourite journal. An obvious problem, and that experienced by many libraries, was that of working on a limited budget, which inevitably led to a reduced quality of service. I could afford very little basic reference material at hand in the office, and had difficulty in preparing as full an information package as I would have wished. From the beginning of my work, I was encouraged to adapt the material resources within Lesney for the basic structure of the library. The necessary resourcefulness required to give an effective service, while dependent on facilities not primarily designed for information work, was exaggerated as the library budget tightened. 'Time' was, though, my most acute problem—e.g. finding time for the daily filing, discussing with marketing managers a recently submitted report, answering a number of desk enquiries, and making preparations for an afternoon's marketing meeting. I found one solution to this time problem in practising fiercely economical working methods—whether in handling a printed document or form, or answering a personal enquiry, corners could be cut by maximising any opportunity to give or receive information. I made the full use of standard Lesney forms and the company's flexible, informal communication lines, to add a note, ask for a suggestion when circulating any memo. I tried to receive feedback each time I dealt with any user—by ensuring I had adequate details on the background to an enquiry, asking for a response to a previous reply, maintaining as receptive an approach as possible to suggestions for improvement.

'Integration with my users' I found personally to be particularly important as, with little subject knowledge, I had to make the effort to be accepted as one of the marketing team. This initially required some definition of who my users were—the structure of the company, operating through several overseas subsidiaries, and with three factory sites in England alone, made it virtually impossible to maintain contact with all potential clients of the company library. I did, however, try to understand the requirements of users outside central marketing, where I thought I could easily be of value—I circulated IT newsletters to the company computer analyst, reported to interested parties in finance on access to London law libraries. I would certainly agree with Orna's[9] statement that a degree of humility is required in order to get on users' terms; a willingness to learn from my users was essential and I had to avoid the impression that a library service was being imported from outside. Lesney provided me with full involvement: after an induction fortnight I found myself participating in an effective presentation course, attending a market research presentation, and experiencing the first marketing meeting. By remaining closely involved with users' requirements, I was able to assess their reactions, and ensure that I was giving a degree of satisfaction.

The third prerequisite for the successful operation of my O.M.B. was a clarity and simplicity of presentation, in preference to a depth of retrieval—the service was the better received when it did not try to reach beyond its practical limits. I did not have the time to devise, nor did my users have the time to learn, lengthy surveys, questionnaires, evaluation studies, or even any detailed classification system—though the principles of all these were applied in the course of the work. In the context of my close-knit marketing environment, such an approach would have appeared irrelevant and even arrogant, so I concentrated on clear signposting and labelling in organisation of company files, clarity rather than perfection in report work where I could not claim to be a market research analyst. I tried for simplicity and quality of presentation and attempted to give some publicity to the various library activities—developing a 'marketing' push to my part of the service.

I realised that the O.M.B. was functioning when I was making the most of each interface with users, was well known to and accepted by the team, keeping the results to a digestible format, and adapting to the users' priorities and attitudes to work in my own role in the company.

O.M.B. libraries can certainly benefit from contacts with others, such as through the Aslib O.M.B. Group: the more so since liaison with libraries is not a normal part of their work, and they remain fundamentally isolated from the rest of the profession. Personally, I found that—for my 'one-man band' to draw the crowds—rather than bewail the strange venue, lack of background accompaniment, and poor orchestration, it was better to sit at the front of the stage with the instruments I had, and keep playing to the audience.

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Note from the ASLIB Director, Dr. Dennis Lewis.

I was glad of the opportunity of reading this paper by Michael Perrott, since it is an area of activity in which I have taken particular interest.

Many of our readers of *Aslib Proceedings* will know that an informal group of 'One-Man Bands' has been formed under the Aslib umbrella; indeed, reference to this group is made in this paper – pp 157 and 162. I think that the paper makes a unique and valuable contribution to the development of OMB's.

In particular I like its essentially practical approach, since it concentrates on the realities rather than the theories. The words 'clarity rather than perfection' on p. 162 struck me as particularly apposite – not just for report work, as suggested; not even for OMB's, but for our field as a whole.

The effective management of *time* by OMB's is brought out by the author. It suggests to me that we (i.e. Aslib) should be doing something practical by way of help here. Maybe this will be but a section of a 'Manual for OMB's' which we might publish.

Your comments welcomed.

Letter to the Editor

MARKET RESEARCH REPORTS

The Statistics and Forecasting Unit of the Building Services Research and Information Association is one of those organisations publishing market research reports which are available only to firms and individuals and not libraries.

The article by D. King[1] on the problems facing libraries wishing to build a collection of market research reports was very interesting but like all literature on this subject, however, it fails to appreciate the economics of producing such reports.

Many of these reports are specialist reports which, while important within their industry, do not attract the wide readership of consumer product reports. The simplest of these reports costs several thousand pounds to produce and expected sales may be less than 30 copies. If five sales are lost because the report can be freely consulted in a library the revenue from the remaining sales may not cover the costs of production.

Small marketing organisations, particularly in the industrial market, use these published reports as a means of attracting more remunerative commissioned reports. They therefore want their published reports to be on the desks and in the bookcases of the senior managers who are likely to commission such work. Reports of this type in libraries are usually consulted by marketing assistants with no responsibility for commissioning work and they transmit the information they obtain from these reports by the partial copying of significant tables, frequently without reference to the original source.

There are however possible solutions to this problem. Although the marketable life of a market research report is unlikely to exceed two years, the value of the report as a source of information, particularly where no other is available, may well extend over five years. An old report can be the basis on which more recent information is collected and can indicate where further information can be obtained. It can be an invaluable introduction to an unfamiliar market. Libraries may well find that the publishers of such limited circulation reports will be willing to let libraries have copies of them after the initial sales period is over for a reduced price or indeed no price at all.

As a user as well as a generator of market reports I appreciate the problems facing libraries but if a solution is to be found it is necessary for libraries to consider the problems facing not only information users but also providers and they must understand why many market research organisations are unwilling to see their reports too readily available in public libraries.

Catherine Petts
Statistics and Forecasting Unit,
BSRIA, Bracknell

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Document delivery, now and in the future

Maurice B. Line
British Library Lending Division

Paper presented at the Aslib Conference 'New approaches to document delivery: systems, services and their implications', London, 22 November 1982

Introduction

ALTHOUGH NO LIBRARY has ever been self-sufficient, full recognition of local insufficiency has developed only in fairly recent times, as the output of published material has grown at an unprecedented rate and at the same time its bibliographic control has improved enormously, even though computer-based bibliographic searches generate only a small minority (one-seventh or one-eighth) of document requests. Some means of access to external resources becomes increasingly necessary, and new possibilities for achieving this seem to be dawning. The implications of moving from a 'holdings strategy to an access strategy', as suggested in the recent LISC Report[1], are far-reaching; I propose to touch on some of these in this paper. The major revolution is that technology appears to be on the verge of making it possible, perhaps even easy, to transmit texts to users over long distances.

Requirements for document delivery

The main requirements for any document delivery system can be simply stated. *Users* need:

Reliability—a consistent service
Probability of success
Speed of supply—always reasonable, and on occasion fast
Little or no cost to them
An acceptable form—which in nearly all cases means print on paper, with good reproduction of important illustrations (a high proportion of demand is in biomedicine), *not* computer printout
Ability to assess content and quality before ordering.

Libraries need what users need and also:

Simplicity of use (of requesting, payment, etc.)
Reasonable cost (*not* free—nothing is free and something that appears to be so is bad for the economics as well as the soul of the requesting library)
Single point of access for all materials.

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Current responses of libraries to economic constraints

Libraries cannot wait for an electronic revolution, and are already having to take measures to serve the needs of their users with reduced resources. They may take a deliberate decision to cut acquisitions and to rely more on interlibrary borrowing, or they may rely more on interlibrary borrowing *because* acquisitions have had to be cut. Librarians need to calculate, as I am sure many of them do, the relative cost of acquisition and interlibrary borrowing, taking into account such considerations as that many important articles picked up by browsing would not be identified for the purposes of obtaining from elsewhere. It looks incidentally as if the total *national* cost of requesting and supplying a photocopy in the UK is about £2.30, and of a loan about £4.00,* though there are enormous variations, depending on the efficiency of requesting and supplying libraries, etc; these figures provide something of a benchmark against which to judge alternative systems. I would guess that quite a few journals are purchased because they have been requested so much on interlibrary loan; indeed, interlibrary borrowing, especially photocopying, serves as a shop window for journals, though it might not seem so to publishers.

However, as well as cutting acquisitions, librarians may ration interlibrary borrowings. They may do this by several methods, including charges to the department or individual user (in my view a very unsound practice unless the charge is merely nominal, because in effect the library is penalizing its users for its own faulty selection, and the logic of this approach would be to buy nothing but to charge users for obtaining all items from elsewhere). It is noteworthy that the very large cuts that have been made by some university libraries in their journal subscriptions have not been accompanied by an increase in interlibrary borrowing—rather the contrary. Indeed, interlibrary borrowing trends are roughly similar to those for acquisition budgets and to issues from local library stocks, with about 2 years' time lag.

It cannot be too strongly emphasized what has often been said before: that interlibrary borrowing is not a substitute for local acquisition, only a supplement. What happens when libraries become unable to afford either acquisition or interlibrary borrowing is a question to which we may see the answer in a few years, unless there is a dramatic improvement in the resources made available to libraries.

A popular remedy for local insufficiency is 'resource sharing', which appears to have taken over as the Most Desirable Trend; it somehow sounds a bit better than co-operation, as it seems to imply some measure of planning. However, resource sharing does not *extend* the resources available unless there is a co-operative acquisition system, and it has yet to be shown that the costs and problems of operating such a system are justified by the results. In fact, what happens when the funds of libraries become tighter and tighter is that their acquisitions tend to become more and more similar to one another as they concentrate more on the core materials, so that total national availability gradually declines. Merely improving access to the holdings of other libraries does not help much, since if it takes place on any scale it imposes an increasing burden on the libraries from which materials are requested. In the nature of things, these tend to be a relatively few large general libraries, which in due course may have to refuse to accept requests or charge high fees to cover all the costs of servicing them. There is now enough experience, in the UK and in other countries, to state categorically that for ensuring extensive national resources, reliability, speed of supply, and ease of use, supply from a central stock is much superior to 'resource sharing', and it is also the most economic in national terms if all costs are taken into account and if demand is fairly heavy.

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* The figure of £4.00 for a loan is an average, covering both books and journals. The great majority of loans are of books; loans of journal issues are much cheaper (estimated at £2.80).

Technological developments

I do not propose to deal with technological developments more than superficially, as they will be discussed by other speakers. The technology of requesting documents has already made great advances. In the future, one would expect nearly all requests to be made by computer, with facilities for switching requests from one location to another as necessary, and also for fast response in the case of non-supply or delay. One important point that has received little attention is the need, and the ability, to monitor requests received by computer, in order to make sure that the provision and supply system is responsive to changes in demand.

There are several possible applications of technology to the supply of text. Some of these are suitable only for short texts, or to texts without illustrations, and it looks at the moment as if the most promising medium for storage and subsequent transmission is the Digital Optical Recording (DOR), promising as it does high density storage, high quality reproduction, and fast transmission. It should however be noted that this ideally requires a high speed high quality printer at the receiving end, whether this is a laser printer or an ink jet printer (or some printing technology not yet devised). We can probably expect a variety of storage and transmission media and techniques to be tried out in the next few years*. It must be hoped that one of them emerges quickly as a winner, otherwise libraries will have to choose between different kinds of expensive device largely on the basis of guesswork or, if they are rich enough, assembling a collection of machinery most of which will be obsolete in a few years.

Likely changes in the provision of documents

Books seem likely to remain relatively unaffected by technological changes in transmission, apart from reference books, many of which seem ideally suited to electronic storage (including continuous updating) and transmission. However, the academic market at least is shrinking, and some monographs that would have been published 10 years ago are now no longer publishable commercially: either they never see the light of day or they move into the murky area of 'grey literature'. It would be expected that grey literature of various kinds was increasing, at least relative to formally published literature, but it is almost impossible to obtain hard data on this, partly because the greyer the literature, the more difficult it is to know whether it even exists. Thinking further ahead, however, one might envisage in some subject fields the conventional book of between 150 and 400 pages gradually giving way to collections of 'chunks' of information, each usable on its own as well as forming part of a larger whole: radical changes in media could lead to radical changes in the structure of the matter.

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* Possibly ADONIS, APOLLO, ARTEMIS, HERMES and the rest of them could be grouped in one big system PANTHEON (Public Access by New Technology to Highly Elaborate On-line Networks).

The major impact of technology will undoubtedly be on journals. Journal publishers have been talking about 'the coming crisis' for years, but it always seems to be round the corner. The net number of journals published is still growing, although the average journal is probably shrinking in size. One main reason for this is that publishers, faced with a relatively declining market, often split journals on the grounds that this will increase their income even though the sales of each new journal are less than that the original journal. Recent data from the USA indicate that the market until 1980 was nowhere near as poor as was suggested, but the situation has grown worse since then, and it may be that the long awaited crisis now really is imminent. (Between 1976 and 1980 85.5% of US scholarly, scientific and technical (SST) journals maintained or increased their circulations. In the same period the mean gross sales revenue of US SST journals increased by 68% in constant dollars[2]).

However, the effect of the crisis will not be a simple one. There is a high concentration of demand on a relatively small number of journals: fewer than 10% of the 55,000 current journals taken by the British Library Lending Division receive 75% of demand, and 3% receive 50%.[3] High-use journals, even though they are very costly, will probably continue to be viable in their printed form, because most of the libraries whose institutions have interests in the relevant subject areas will need to buy them. However, although these journals do not need to 'go electronic' it is in general their publishers who can best afford the investment to do so. Paradoxically, many journals that receive very little use will also be fairly secure in their conventional form, because they are published by institutions for prestige purposes, and have almost certainly never recovered most of their costs. It is journals in the middle range that could benefit most from electronic storage and transmission, but they will probably be able to do so only by hanging on to the coat tails of the big journal publishers.

For the next decade at least most journals will continue to be issued in conventional form. However, we can expect a gradual trend towards the supply of single articles, instead of or as well as conventional issues and volumes. Supply of articles will be mainly on demand from microfilm or electronic stores, and may or may not be accompanied by published synopsis journals. If articles are available only on demand, and not in conventionally published journals, a much greater responsibility will incidentally fall to bibliographic control. The attractions of on-demand provision of articles are obvious: they save the publisher's storage costs, they keep all articles in print, they avoid the risk of over-production, and they attract the market for single articles at a time when the market for full journals is declining.

A few journals will be made available only on demand, but an increasing number are being made available both in conventional form and on demand, mostly from electronic stores. Publishers seem to be aiming at a double market, for full journals and for single articles.

There are various possibilities for making texts available from electronic media. Prints could be produced at a single centre and transmitted through the mail from there; or there could be several centres. This is the ADONIS concept. Articles could be transmitted directly online to receiving terminals, and printed out there. DORs could be sold to libraries or other centres, whether these DORs represented full journals or 'packages' of articles on particular subjects culled from a variety of journals; the libraries would then produce texts on demand from the DORs for their own users. Because of the difficulty of controlling the subsequent use of material supplied to libraries in the form of DORs, this last alternative seems likely to be adopted by publishers only if they charge very high prices for the DORs. One advantage of on-demand supply for publishers is that they can have more control over their products, and they will surely sacrifice this only on very special conditions.

Whatever the precise solution adopted, the possibility is opened up of the supply of some articles not through agencies like the British Library Lending Division or through co-operative systems but from publishers, directly or indirectly.

It is interesting to speculate on what will happen to journals made available in dual form, conventional and electronic. It would of course still be possible to make photocopies from the conventional versions as now, but in the longer term, direct transmission from the electronic version would appear to be more satisfactory, from the users' as well as the publishers' point of view, provided that there are proper facilities for producing good prints at the receiving end. Some arrangement must therefore be sought between publishers, who would almost certainly need an intermediary of some kind in any case, and central libraries such as the British Library Lending Division which have supplied articles in the past, if only because of the need for a single, simple access point.

There must be a high concentration of demand on articles *within* journals[4]; this is probably not as great as the concentration on journal titles, but possibly one or two per cent of all articles account for half of all demand. This means that libraries, by buying journals as packages of articles, are spending money on numerous articles that are never used—not only buying them, but binding them and filling up their hard-pressed storage space with them. At the same time, libraries have to obtain from elsewhere many articles from journals to which they do not subscribe. Whether the selling of large quantities of unused matter is regarded as a gigantic confidence trick or as a disinterested service to knowledge, or both, the ability to obtain good prints of articles on demand could tempt librarians to build up optimal collections of *articles* rather than of *journals*. These articles would be kept by the library, not passed to users as photocopies are at present. In this case, the obtaining of documents would not be interlibrary borrowing but a form of acquisition.

How tempting the alternative of article rather than journal purchase will be depends partly on the pricing of articles acquired on demand. Too high a price would favour purchase of full journals where they existed, and where they did not exist it could discourage use, except by relatively wealthy sectors like the pharmaceutical industry. On the other hand, too low a price could kill off the conventional journal. If, as is still the case with secondary services, the printed version is subsidising online access, its demise would result in a rocketing of the price for online access. It must be doubtful whether the market can sustain dual publication for long. Publishers have several options: to price online access high and see what happens; to use variable pricing for different markets or different subject areas; or to price low in order to attract demand until costs come down—or until the market has been captured and they can put up prices.

If libraries continue to buy for stock journals rather than articles, will they be tempted, or possibly forced by hard economics, to charge users, or their departments, the full costs of obtaining for them articles from other journals? In such a case, will users be tempted to leave out the library altogether, and pay the supplier direct? This risk certainly exists, but while individuals may use articles online for scanning purposes and deciding what they do *not* want to read in full text, for actually *reading* articles they will probably want not only a hard copy, but a *decent* hard copy. A decent hard copy will be possible only with high quality printers, which will certainly not be available in every department, let alone on every desk. However, we do not really know what users would actually accept. They have several choices: of reading online; of quick and dirty prints, produced at their local terminal; of slightly slower but better prints, produced at a library terminal; or of rather slower but very high quality prints, produced by a central supplier. Much will depend on who pays whom and how much.

Another critical issue is how the use of electronically stored publications will be controlled. The risks inherent in selling DORs to libraries have already been mentioned. The risks do not end here, because even if publishers or intermediary suppliers held on to the DORs it would not be difficult to transfer text into a local computer store for subsequent use, nor would it be difficult to make a print at a receiving terminal and photocopy it for subsequent distribution. The higher the prices publishers charge, and the more restrictions they place on use, the greater the danger of piracy. No librarian would of course ever be guilty of piracy, but we know what users are. We also know that publishers are not always totally trusting.

Another possibility is that articles that receive little use may become unavailable because their low use (possibly their non-use) will be exposed. Publishers may not be willing to continue to hold in their stores material that no-one wants to use. Worse, they may be tempted to use market rather than quality criteria in deciding whether to accept articles in the first place, in the same way as they do with books, although guessing the likely readership would be even more difficult. At present, the quantity of low-use articles published is largely concealed, because they are bought as part of a total package, but such concealment will no longer be possible with on-demand supply. The system to date has favoured the author; an on-demand system would be biased towards the user. If low-use articles are published at all, different systems could develop an easily accessible store for high-use articles, and a 'dump' for low-use material. It is not impossible that higher charges may be made for access to low-use articles than to high-use articles, because the total unit costs of access to low-use articles will be much higher. This could have the rather absurd effect that less useful material would cost more than more useful material.

Commercial intermediaries

It was suggested earlier that publishers would want an intermediary in supplying journal articles on demand. It is impossible to envisage direct supply from all publishers to all consumers, and there will undoubtedly be some equivalent of the database operators in secondary services. However, the intermediary role could spread much further than this, and indeed this is already happening. Some organisations, like ISI and CAS, are involved in document supply not as a prime function but largely to encourage use of their main services. More significantly, especially in the United States, information brokers are proliferating. In the belief that there is money in information, more and more people, often individuals, are going into the information supply market, undertaking anything from bibliographic searching to the supply of documents. It looks in fact as if there will be information wholesalers in the form of database operators, and information retailers in the form of brokers, both firmly in the commercial sector. Will these operate happily alongside public sector intermediaries like the British Library Lending Division, compete with them, or co-operate with them? There may be money in the supply of articles in high demand, but what about the rest?

These issues are far too big to explore in detail here, but they affect profoundly not only the user of information but the library through which he has traditionally obtained most of his documents; the author, who may find it more and more difficult to get 'unpopular' articles published; and indeed the publisher, whose survival has depended on a strong public sector in information supply. Ultimately, the 'information health' of the nation is affected, and consequently its scientific, technical, economic and social welfare. What is clear is that there is a strong and legitimate commercial interest in document supply, and an equally strong and legitimate public interest[5]. Somehow these interests must be reconciled. Over the years a good and workable balance has evolved that has been more or less satisfactory to both sides; it is only in recent years that recriminations have occurred, and they have not by any means been confined to the private sector.

Is change necessary?

If one considers the present situation with regard to document supply in the UK against the criteria specified at the beginning of this paper, its performance is not at all bad. The probability of satisfaction is high, and reliability is good. The average speed of supply is quite fast, although it is very difficult to supply very urgent needs. The costs are low—in national terms, to the local library and to the user. The system is simple to use, largely because one centre, the British Library Lending Division, handles three-quarters of all UK demand, and deals with virtually all categories of material. It is easy to monitor demand and performance. The greatest weakness, apart from the difficulty of dealing with urgent cases, is the inability to assess the content and quality of a document before ordering it. It should be noted that several of the above virtues are due to the fact that the supply system is mainly in the public sector.

It could be argued that there is no real need for change or improvement. The pressures come in fact not from libraries or users, but from publishers, partly because they feel they are not receiving all the money they should from use of their publications, partly because economic and technological factors are causing changes in the form of publication. However, wherever the changes originate, they will occur, and their likely effects should be studied with the greatest care.

On-demand supply from electronic stores should be able to achieve an equally high probability of satisfaction as the present system, provided that low-use articles do not become inaccessible. The speed of supply should be faster, in due course possibly almost instant. The costs may or may not be higher, depending on how much the true costs come down and on the prices that are charged; certainly an on-demand system could be more expensive for the library or the user. The system could be as easy to use if all requests can be channelled to one place, otherwise it will be more difficult to use. Monitoring of demand and performance could be easier if requests were all received by computer and regular analyses were carried out, but whether this happens and what use is made of the analyses depends on how much the system is in the public sector.

Although it appears that the direct effects could be on the whole beneficial, they would not be dramatically so, and a heavy price might have to be paid, not only in hard costs but in the indirect consequences to the whole publication and access system. A total market economy in journal publication is something that no-one has experienced, and whose effects therefore no-one can predict. Publishers are in general optimistic because they believe there to be a far bigger market for single articles than at present. Certainly, if one makes calculations on the assumptions of, say, a tenfold increase in demand, the economics look quite good—and some estimates are much more extravagant than this. There is no doubt that improved systems generate demand—witness the great growth of interlibrary loan demand in the UK between 1961, when the National Lending Library for Science and Technology came into operation, and 1980, although even this was only a fourfold increase. However, it must be very doubtful whether any improvements produced by electronic technology will be significant enough to cause another such growth in the UK, especially when the market seems likely to remain depressed for some time. If the application of technology to the storage and transmission of documents without careful thought as to its possible side-effects leads to a reduction in the number of documents published and/or to high prices for many of those that are published, demand could very easily decline.

Conclusions

The immediate future will be more or less a continuation of the present, with no easy or cheap solutions to the economic problems facing libraries: they will not be able to afford to buy, or obtain from elsewhere, so many documents as they have done in the past, and their users will not do much to help them out.

In the medium term, the situation will be confused and confusing. It looks as if there will be a mix of supply from conventional documents, as now, and supply from master copies on demand, the latter on terms set largely by the publishers, but ultimately by the market. The two kinds of supply can and should be accessible through the same channel or channels.

Electronic miracles do not necessarily produce economic miracles, and several major economic questions have to be answered. How much published information will the market stand? Who *is* the market—the library or the user? How will publishers price their products? Will libraries charge their users? How much 'economic space' is there between publishers and consumers for intermediaries, and who will occupy it?

We are entering into uncharted territory, and even the best researched prediction may prove to be little better than guesswork. I am not satisfied that the possible consequences of electronic document storage and supply have been thoroughly explored. The ecological balance of authorship, publication, distribution and consumption is a highly delicate one, depending to a large extent on the balance between public and private sectors. If the present balance is to be disturbed, in the interests of all concerned some new accommodation must be sought.

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Project Hermes

D. M. Yates

National Physical Laboratory

Paper presented at the Aslib Conference 'New approaches to document delivery: systems, services and their implications', London, 22 November 1982

1. Background

IN 1981 the National Physical Laboratory and Pira undertook for the Department of Industry a project definition study for a document delivery project to be known as Hermes. The prime aim of the project was to give a practical demonstration of how Teletex (n.b. not Teletext) technology may be applied to publishing activities. The aim of this paper is to describe in outline the system proposed by this study. Recently (November 1982), detailed planning of the first phase of the project has been initiated by the Department.

2. Aims

The project definition study recommended that the Hermes project should have three underlying aims:

(1) To demonstrate Teletex in use for document delivery and so promote awareness of the technology and its applications.
(2) To stimulate product development.
(3) To provide a foundation for a subsequent public document delivery service if this should prove economic.

Before describing how these aims might be achieved, a brief description of Teletex is appropriate.

3. Teletex

Teletex is a set of conventions (embodied in a series of CCITT recommendations,[2] and thus endorsed by the world community of telecommunications authorities) for the transmission of information in the form of character-coded text over communication networks. It can reasonably be seen as a super-Telex, with several critical advantages over the earlier medium:

(1) the terminals embody microcomputers, thus allowing error correcting protocols, buffer storage of incoming and outgoing messages, word processing facilities, and great flexibility for future development;

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(2) a great increase in speed;
(3) a wide variety of character sets;
(4) greater freedom from transmission errors (because of the protocols mentioned above);
(5) an explicit intention to extend the standard in future so as to allow embedded graphical material to be input, stored, transmitted, displayed, and printed using facsimile techniques;
(6) the potential for integration with other computing/communication systems such as local area networks.

A Teletex terminal is a device like a word processor, with keyboard, screen, printer, internal storage of text and the capability of exchanging textual documents with similar terminals over public networks using the CCITT Teletex recommendations mentioned above.

Teletex is thus generally seen as an 'electronic mail' system between terminals, but its status as an internationally-accepted recommendation also makes it a promising basis for document delivery from computer-based systems to the same terminals. It is this potential which Hermes is intended to exploit.

4. Project development

To meet the aims described above we proposed a four-phase project, each phase having its own goals, so that the plan was not unnecessarily monolithic and could be redirected or curtailed if necessary. The later two phases are speculative but it seemed to us essential that Hermes should include this long-term sense of direction as well as clear and practical short-term aims.

Phase 1

Aims:
1. To demonstrate Teletex in use in the UK. Terminals would be situated in DoI, publishers' offices, and libraries; total number in this phase about 20.
2. To demonstrate interworking between different types of Teletex equipment.
3. To demonstrate Prestel and Teletex capability on the same equipment, if possible.
4. To use the system in practice for communication, for example between publishers and users of published material, such as libraries.
5. To make detailed plans for phase 2.

The physical system in phase 1 would consist of commercially-provided Teletex terminals and communication lines only.

Phase 2

Aims:
1. To demonstrate access from the Teletex terminals established in phase 1 to an automatic document delivery service providing documents (supplied by publishers) in character-coded form.
2. To make plans for phase 3.

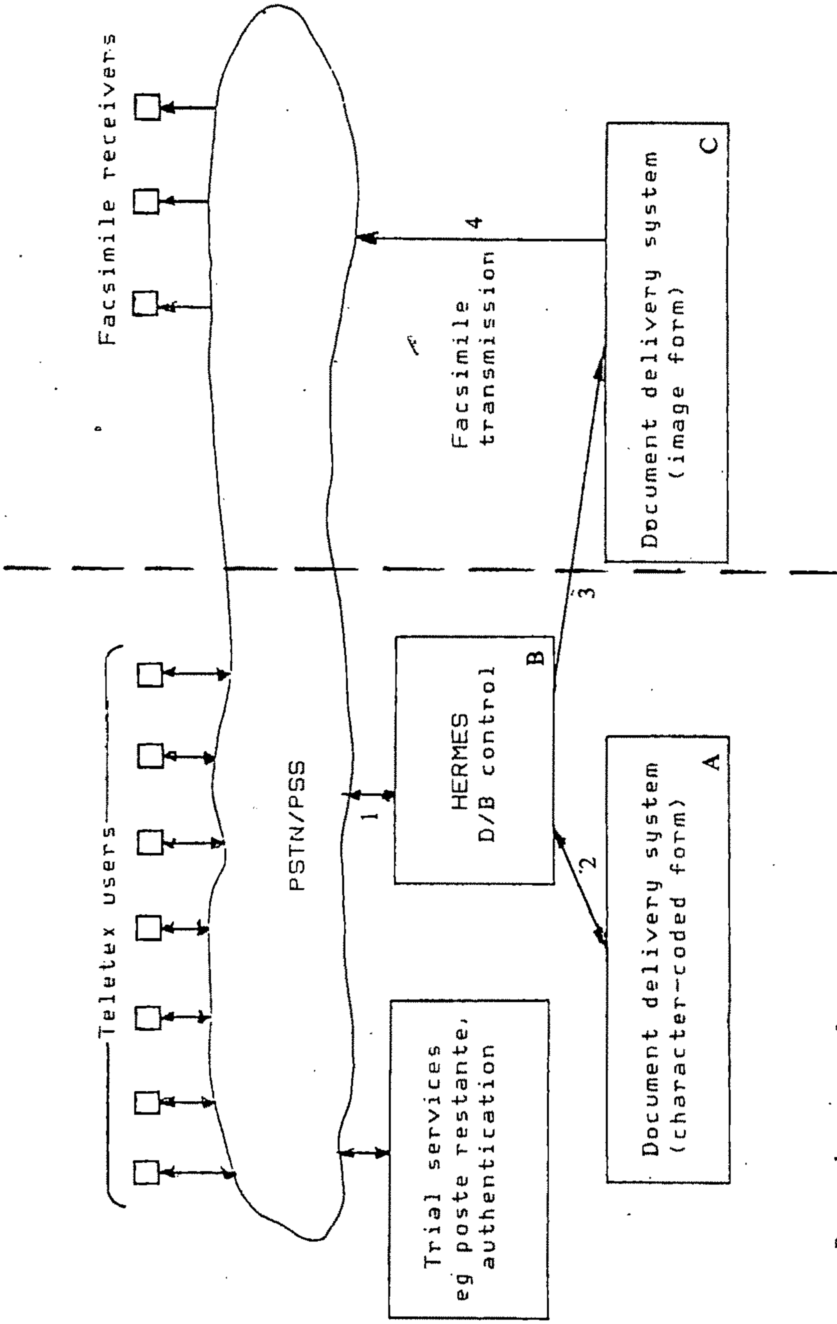

Fig. 1: *Proposed system configuration*

A document-holding data base system must be established with a capability of receiving requests and supplying documents by Teletex.

System A (see Fig. 1) comprises only commercially available products and services: a mainframe computer with a full text document retrieval package. System B is a small computer with no major storage, but requiring software (specially developed for this project) to convert Teletex requests to the format required by system A and converting system A's output to Teletex form.

System B's functions are:

(1) to provide (on interface 1) up to 10 simultaneous Teletex ports (incoming requests are brief and could if necessary be queued; but output would be longer, and to avoid unacceptable delays must be handled in parallel).

(2) to provide (on interface 2) whatever system A requires, if necessary a simulation of conventional terminal characteristics.

If graphical material is to be retrieved this could be achieved by adding a parallel facsimile service, as shown on the right of the diagram, for diagrams alone, or for complete documents. Such a service would not contribute directly to the aims of the project and would therefore only be developed if it was economically justified by a particular application; the same applies to the trial services indicated on the diagram.

Phase 3

Aim: To provide, at Teletex terminals capable of receiving information in coded-character and facsimile form alternately, a document delivery service from a database which is large enough to require optical disc storage.

The service should be set up on the basis that it can evolve to being self-supporting financially. The terminals previously established will of course not be capable of receiving the image-coded sections of documents.

This phase builds on the plans, mentioned above, to extend the Teletex recommendations to allow embedded graphical material to be transmitted and printed using facsimile techniques. The increased storage requirement for the document collection could be met by the use of digital optical discs, which, on present plans, are an excellent match in capability, and a reasonable match in timescales, with the enhancements to Teletex. In principle information in other media, including speech and moving images, could also be stored, though the need and economic justification are not yet clear.

For reception of the mixed character-coded and image documents there are two possibilities. One is that the terminals are new ones capable of displaying and/or printing mixed-form documents. (Old-style terminals would be usable but of course could not receive graphics). The other possibility is that the terminal comprises separate character-based and facsimile equipment with an (automatic) controller which directs incoming pages to one or the other as instructed in a heading code. Equipment should be available to allow the first option to be taken. The facsimile quality may be low, or the transmission time long, or the cost high; and a careful compromise will be needed.

Phase 4

Aim To develop the service established in phase 3 into a public document delivery service.

In phase 4 the technology of phase 3 would be replicated. To connect more subscribers it is probably better to have local systems, each with a copy of the complete database, rather than everyone competing for access to a single central facility. New discs would be distributed from time to time, and the latest documents would only be available centrally until the next such distribution.

In all phases it will be important to encourage users to integrate their terminals with any local systems they may have for word processing or data communication—for example by replacing the conventional terminal by a port on to a local area network, or by establishing interchangeability of floppy discs. Because of the variety of local circumstances it is not possible at this stage to be more specific, but the aspect is one which should be frequently reviewed.

The report of the project definition study also made recommendations on timescales and on specific databases and organisations to have terminals, but publication of these suggestions must await the agreement of all those concerned. The databases included several which were text only (no graphics) which would be ideal for phase 2. The report also included a study of users' requirements which are clearly central to the whole project, and in this and many other areas I would like to acknowledge the contribution of Mrs M. Y. Gates and her colleagues from Pira who collaborated with NPL in the project definition study.

4. Conclusion

Hermes is a proposed document delivery system based on Teletex, intended initially as a demonstration project but designed to provide a foundation for a subsequent public service if this should prove economic. At present (November 1982), detailed planning of the first phase has been initiated.

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Document delivery services and copyright

Gillian E. Bull

Department of Information Studies,
University of Sheffield.

Paper presented at the Aslib conference, 'New approaches to document delivery: systems, services and their implications', London, 22 November 1982

Aslib's involvement in copyright

THE STAFF AND MEMBERS of Aslib have long been noted for taking a close interest in the topic of copyright, and have done a great deal in recent years to clarify the copyright problems experienced by members, and to represent members' interests in national debate. If I may remind the audience of some Aslib activities in very recent times—for example, in the *Supplementary Memorandum* submitted by Aslib to the Price Committee in 1980[1], this statement was made *re* copyright:

> 'The inherent dilemma of the laws relating to such things as copyrights and patents is that they encourage individuals to create information by offering some protection against misuse but limit accessibility once it has been created. The fact that advances in technology have made it easier to make use of intellectual property without due recompense does not change the nature of the dilemma for those who seek to optimise dissemination without breaking the law'

This is not only a most succinct summary of the problems created by the essentially dichotomous nature of copyright (expressed at the moment in the UK by the copyright owner's monopoly vs. fair dealing), but, in the context of the vitriolic conflict waging between copyright owners and librarians since evidence was requested for the Whitford Report[2], a welcome breath of sanity.

In 1981, the Aslib Annual Lecture[3] was delivered by Edward Ploman, co-author with L. Clark Hamilton of *Copyright, intellectual property in the information age*[4]. This book is a delight to read—not something one often says about works on copyright, since Dr Johnson, Macaulay and Mark Twain stopped writing about it. In it the authors present a clear summary of the tortuous history and development of copyright and its allied concepts, examine their unique international control mechanisms, and consider their complex relations with social and economic factors. The evolution of copyright to protect works expressed in media apart from that of print is mapped and the suitability of such extensions debated:

> 'Copyright is used as a legal mechanism for the ordering of social and cultural life, or, put another way, *copyright is one method for linking*

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> *the world of ideas to the world of commerce.* Just as many of the traditional assumptions for organising and controlling the flow of information in society are called into question so too are the economic assumptions on which the law of copyright is founded. And these assumptions condition the patterns of our cultural and scientific life. ... Copyright is ... expected to provide answers to another set of fundamental questions: how can intellectual creativity best be promoted? How is the livelihood of the author and artist best ensured and how is he integrated into social and economic life?'[5]

It will be difficult for me to consider copyright problems and document delivery services without straying into economic and social areas.

In 1981 Raymond Wall spoke at the Aslib Annual Conference in Oxford, on 'Photocopying myths and concepts: a librarian's view',[6] and there made a reassessment of the reprography issue and some others, including a brief mention of 'on-demand publishing'. His model of the 'communication and information chain' presented in that paper should have given disseminators and users of information pause for thought, as it demonstrates so clearly their interconnection. The economic ills he diagnosed will not be cured by legislative or regulatory tinkering, and I hope that no one harbours any such expectations.

Finally in listing Aslib's recent activities in this area, I must mention their response to the Green Paper on Copyright last year,[7,8] which I regard as yet another attempt by Aslib to ensure that the UK achieves something like rational reform in this area. Aslib were clearly worried that the public interest was being lost sight of in some places, including that of computer use of copyrightable materials. Commenting on Chapter 8, Computers, in the Green Paper, Aslib make the plea 'that it is not sufficient to leave everything to licensing agreements, since these could lead to restrictive practices which are not in the public interest. The situation is likely to further be complicated by the development of document delivery systems and it is a matter of some urgency that clear guidance should be given on what can and cannot be covered by licensing agreements before these systems come into general use.' Aslib, like Ploman and Clark, would prefer that new copyright law should not be too closely shackled by particular gadgets. They ask that 'generally accepted analogies be developed between information in printed form and that in machine-readable form. Definitions are urgently needed of what elements should attract copyright protection and what should not.'

In the context of current UK progress towards copyright reform, I wonder if Aslib are not being too sanguine in asking for such guidance, even though their line of argument is sound. In the Green Paper licensing agreements clearly are considered apposite in the context of reprography, apart from whatever exemptions reformed versions of sections 6 and 7 may allow. (I will return to the public interest question later.) Furthermore, to ask for more guidance on anything, when, four years after everybody had made their (incompatible) views perfectly clear to Whitford, we were presented with a Green Paper littered with invitations to further public debate, may simply result in more delays before the new Act. One might say, better the 1956 devil we know for the time being, if the outcome of discussions is to be a better piece of legislation in the long run. It is hard to tell. Chapter 8 (6) of the Green Paper invites comments on the questions of VDUs and hard print copies. When one considers all the evidence available at the time of drafting the Green Paper, and discussions of the dangers of legislating on specific mechanisms that can be found in the writings of Ploman and others, one might have thought that what was needed was legal advice from those not committed to information technology (the Law Commission rather than the Department of Trade), and a policy decision on the future of the copyright monopoly in the UK, what its role should be and what limitations should be set upon it with regard to the requirements of the Berne Convention and the Treaty of Rome. But apparently not—we may be on this roundabout for some time yet.

Now I have listed the activities of Aslib in this area you may appreciate why I regard this paper as an extreme example of 'follow that'. Furthermore, my preliminary reading for this paper has reconfirmed my view that there is nothing new under the sun, as every time I hypothesised what I thought might be a new situation or problem, I was sure to find that someone had dealt with it already—often twenty years before.

Characteristics of copyright

To go back not twenty, but forty years, and to the USA, I would like to mention Zechariah Chafee, writing in the *Columbia Law Review* in 1945,[9] where he commented:

> 'Copyright is the Cinderella of the law. Her rich elder sisters, Franchises and Patents, long crowded her into the chimney-corner. Suddenly the fairy godmother—Invention, endowed her with mechanical and electrical devices as magical as the pumpkin coach, and the mice footmen. Now she whirls through the mad mazes of a glamorous hall.'

Now, in the 1980s, she plods down the dull corridors of UN agency buildings, but this is not the only change. Chafee was concerned with the difficulties within copyright principles raised by '. . . motion pictures, the radio, and other novel methods of creation and infringement.'

We have more problems and more technology. My reason for referring to Chafee (apart from his idiosyncratic imagery) is that I find his listing of characteristics of copyright useful, especially as it has been drawn up in the Anglo-American law context, but outside the UK. Chafee considered that there were six important aspects of copyright that one should examine in order to see how effective it is in any given country or time. First, complete coverage for all intellectual and artistic creation reduced to permanence; secondly, a monopoly against all forms of reproduction; thirdly, international protection; fourthly, absence of excessive protection of the monopoly; fifthly, refusal to stifle independent creation; and sixthly, legal rules which are convenient to handle.

I will now work through this list, in the context of document delivery services. At this point, I must emphasise that I am not a copyright lawyer, and that nothing I will say should be regarded as carrying any authority: these are simply my opinions.

1. *Complete overage for all intellectual and artistic creation reduced to permanence*

On the matter of 'reduced to permanence' UK law has offered and still offers wider copyright protection than US law, as protection is extended here when any literary, dramatic or musical work is 'first reduced to writing or some material form',[10] without a requirement for registration. In the 1956 Act 'writing' is defined as 'any form of notation, whether by hand, or by printing, typewriting or any similar process.'[11] The materials or 'works' envisaged for use in document delivery systems as described to this meeting all seem to have achieved 'material form' in a conventional way, and so the right to prevent the taking of copies will rest with the copyright owners, who seem to be the very publishers who are proposing to commit the works to document delivery systems.

On this matter of permanence, we may actually be abreast of the international conventions. The Green Paper affirms that '. . . copyright protection should extend to works fixed in any form from which they can be reproduced.' Although this statement occurs in Chapter 8, Computers, it may not be confined to computers. Looking ahead, it seems likely that full text systems (the dominant twin of document delivery) may come to contain materials which are first 'fixed' in the computer for storage. Under our present loose categorisation of 'some material form' it seems to me likely that these works would be regarded as entitled to copyright protection, and certainly under the definition proposed in the Green Paper they would be.

Recently (June 1982) a meeting in Paris of Government experts produced *Recommendations for the Settlement of Copyright Problems Arising from the Use of Computer Systems for access to or the creation of works*,[12] based upon draft proposals by Unesco and WIPO. My main caveat about these recommendations is their confinement to the context of computers. The boundaries between computers and communications systems become ever more blurred—the systems discussed here today illustrate this trend—it is not a useful differentiation, and one which the UK proposal would ignore. The Unesco/WIPO *Recommendations* propose that protection should be given 'to material which either constitutes intellectual creation and therefore is to be considered as enjoying protection under copyright legislation or otherwise enjoys protection under such legislation (hereinafter referred to as "protected works"). . . . protected works may embrace in particular the following categories:

' (a) full texts, or substantial parts thereof and other complete representations of protected works;

' (b) abbreviated representations of protected works either in the form of adaptions or derivative works or in the form of independent works;

> ' (c) collections and compilations of information, whether or not resulting from data processing, independently of the kind of information contained in them and of their material support. . . .'

These recommendations carry no definition of computers, for the purpose of these matters, and I would be happier if the type of storage device had not been specified, as it is in the heading 'use of computers for access to protected works' which precedes the categories of protectable subject matter.

However, in both the UK and Unesco/WIPO proposals there appear to be no inroads on the amount of coverage now offered in this country.

2. *A monopoly against all forms of reproduction*

Copying of protected works into the systems described here today would be done by the copyright owners or by their licensees in return for fees. I consider that UK law may well already cover the loading of such materials in such a form, but the Green Paper proposals would increase our confidence on this matter.

'The Government considers that the act of loading a program, or indeed any literary, dramatic, musical or artistic work, into a computer should be a restricted act, and proposes to amend the definition of reproduction to make this clear.' (Chapter 8 (4)).

Similarly, Unesco/WIPO:

> *'Acts concerned*
>
> '4. Input.
>
> 'The act of input of protected works into a computer system includes reproducing the works on a machine-readable material support and fixation of the works in the memory of a computer system. These acts (such as reproduction) should be considered as acts governed by the international conventions . . . and national legislation on copyright and therefore subjected to the author's exclusive rights and the requirement of prior authorisation by the copyright owner.
>
> 'For the purposes of this paragraph, a work should be considered as reproduced when it is fixed in a form sufficiently stable to permit its communication to an individual.'

On transmission of materials both the Green Paper and Unesco/WIPO are silent. The writers of one UK text-book have considered possible infringement by 'transmission by data link', and submit 'that unauthorised transmission of a program or data compilation over wires or other material pathways to subscribers to such a service would infringe the copyright in the work. (*Copyright Act 1956*, ss. **2** (5)(e); **48** (3)). It would appear that the same result would follow in analogous circumstances were the work sent broadcast by wireless. (ibid. ss. **2** (5)(d); **48** (5), (6)).'[13]

The question of storage likewise is not discussed in the official documents, but I suspect that a mare's nest of copyright problems awaits us here. News data systems have been mentioned and statistical data banks and econometric modelling packages are being offered on the market. Who will own the data sets created by acting upon these data with the modelling programs?

On output, the Unesco/WIPO *Recommendations* divide this into 'reproduction' and 'making subject matter available to the public'.

> '5. Output.
>
> 'States should consider granting protection under copyright legislation in respect of output of protected subject matter from computer systems whether this constitutes:
>
> '(a) a reproduction or a corresponding act (e.g. production of a hard-copy print-out or fixation of texts, of drawings of machine-readable forms, of sounds, of audiovisual works, etc., on analogous physical medium, or a transmission of the contents of a data base into the memory of another computer system with or without an intermediary fixation); or
>
> '(b) an act whereby such subject matter is made available to the public (e.g. as visual images or other perceivable form of a presentation of a work).'

I am unhappy about that phrase 'perceivable form', mainly because it reminds me of the knots the Americans got themselves tied into having introduced the phrase 'eye-readable' into their copyright law. Does perceivable involve only sight, in these *Recommendations*? It would appear so, as sounds are mentioned specifically under 'reproduction' in paragraph a.

The Green Paper is much coyer on these issues:

> 'It is arguable that in so far as the reading of a work displayed on a VDU is equivalent to the reading of a book in a library, the act of displaying the work is analogous to merely opening the book to the appropriate page and should not be regarded as the making of a copy. . . . the unauthorised taking of a hard copy printout of a work stored in a computer may apparently constitute an infringement of the copyright in the stored work, just as the taking of a photocopy of a book in a library may do so (subject to certain exceptions).'

Earlier in this paragraph (Chapter 8 (6)) it is acknowledged that copyright owners will probably make allowance for printout and visual display in their negotiations about granting permission for initial copying into a computer store, and will negotiate similarly for broadcasting and diffusion services. 'The Government at this stage invites public comment on the issues involved, and in particular on the question of whether any changes are needed in existing law to deal specifically with VDUs and printout.' It seems to me quite inappropriate that the question of output should be pushed aside in consideration of the 'current realities' of the market. It must be unsound drafting policy. The logic of this would lead us into constant legislative change, following on changing practices in a changing market. The question should not be, Does the copyright owner always give a license to make reproductions at this stage? but, Is the copyright monopoly against all forms of reproduction still appropriate?

On the particular instance of VDUs, the analogy with reading from books may be quite inappropriate. I quote again from a recent UK textbook.

> 'Compare a printed page with a cathode ray tube displaying an image of that page. Both are clearly material objects. Both can be read by the eye because both planar surfaces consist of material substances whose physical properties vary so that some parts will emit light energy more strongly than the other ('dark') parts. In the one case those material substances are paper and printer's ink; in the other, phosphors. In the cathode ray tube the physical properties of the light-emitting material substances are determined by the pattern of electrons impinging from the cathode ray onto the rear of the screen. It is of course irrelevant that the printed page scatters light while the cathode ray tube generates it *in situ*. If that is doubted, replace the printed page in the above example by writing "in lights". The point has practical importance where a work is displayed on the CRT of a computer terminal.'[14]

If this point is valid, then 'display' constitutes 'reproduction', and the Unesco/WIPO differentiation of these two, and the Green Paper analogy with reading are both made in error.

The Unesco/WIPO *Recommendations* have a little more to say on 'acts concerned', i.e. reproduction.

> '. . . in order to harmonize the approach of States in settling the problems relating to input and output and to provide the authors with the real possibility of exercising control when their works are put into computer systems, States should consider the desirability of express recognition under their national laws of the exclusive right of the author to make his work available to the public by means of computer systems from which a perceivable version of the work may be obtained. Such a right may apply to the acts of input or output or to the act of input only, the latter being, in this case, the starting point of control exercised by the author over the destination of his work.'

I have already mentioned the difficult term 'perceivable'. This passage is also remarkable in that 'copyright owners' have been replaced with 'authors', whereas previously they are mentioned in tandem. This may signify only that some of the states involved in drafting the *Recommendations* place greater emphasis on authors' rights than we do, or there may be a more legalistic slant to the matter—it is hard to tell from examination either of the *Recommendations* or of the report of the meeting that discussed them.

To return to familiar territory, now we have worked through input, transmission, storage and output, what of the problem of photocopying? It will not go away with the introduction of document delivery services. The users, once having laid on their hard copy printouts, may proceed with all haste to the nearest photocopier and make single or multiple copies. The cost of printouts or other delivery will have to be discernibly cheaper than that of photocopies, and the service more convenient, if this sort of practice is to stop. I have no idea how you stop it, or indeed what you might do about simultaneous printouts, or the use of multipcopy stationery at the printout point. Perhaps we will develop cheap papers that cannot be used in reprographic machines. The specification for the HERMES Project[15] contains statements of goodwill and reassurance to publishers that copyright protection of their materials will be maintained, but all this comes to very little if the infringement can still take place after the user has got the copy. We still do not know how to police copyright law, and it is here that the monopoly against all forms of reproduction meets its limits.

The HERMES Project also makes mention of closed user groups as defences against unauthorised copying. I will return to these later.

3. *International protection*

The use of telecommunications systems and other such links in document delivery systems clearly marks them as having an international aspect. We have heard today of American, European and UK companies who are forming consortia and also of the European Commission's interest in these developments.

The Unesco/WIPO *Recommendations* are being considered in the contexts of the Berne and UCC Conventions; I assume it will be some time before drafting, ratification and implementation of these *Recommendations* will be complete. I have noted a tendency in the Unesco/WIPO document for the term 'author' to be used where we in the UK might prefer 'copyright owners'. With us the question of 'authors' rights' does not complicate the issue, as all transactions concerning copyright are regarded as part of private contract law, and public law seldem impinges on this area. This is not the case elsewhere, of course. In civil law systems authors are regarded as having moral rights and economic rights, so attention should be paid to these matters where consortia of publishers using document delivery services are scattered through many countries, or where the despatch or reception points are in any countries which recognise moral rights. It has long been considered that the UK may not be honouring its obligations under Article 6 *bis* of the Berne Convention on this matter. The Green Paper states that 'moral rights are provided to some extent by section 43 of the 1956 Act '(false attribution of authorship)' and to some extent by the common law in the form of the laws of contract, passing off and defamation. . . . the Government considers that the occasion of a new copyright act presents a good opportunity to clarify the position and to bring all the provisions necessary to meet the Paris Act together in a single statute.' (Chapter 18 (3)). I look forward with great interest to the introduction of moral rights into the British law, if this is what we are to get.

In the international context, apart from copyright law, one has also to consider telecommunications, media, broadcasting, postal, customs and excise, space and satellite law, not to mention laws relating to culture and education. A useful preliminary analysis of these topics may be found in a recent Unesco publication, written by Edward Ploman.[16] It is a discussion document: no solutions are offered.

4. *Absence of excessive protection of the monopoly*
In the UK, the copyright monopoly is mitigated by the doctrine of 'fair dealing', as set out in sections 6 and 7 of the 1956 Act, and the relevant S.I. (1957 No. 868). In other countries the monopoly is confined by the right of the public to obtain access to information and/or artistic works for purposes of education or the preservation of national culture. I expect that everyone is well acquainted with the pairs of clauses embodied in so many national and international constitutions—on the one hand the creators of works should get the reward of their labours by having the right to prevent unauthorised copying, and on the other hand people should not be prevented from getting access to works for the purposes of education, the welfare of the nation, etc. The origins of 'fair dealing' in the UK and of 'fair use' in the USA are well documented, and the problems with 'fair dealing' as embodied in our legislation are well rehearsed.

The absence of case law on this issue is notorious, but I would speculate that most judges in our system would interpret the law as favouring maintainance, if not strengthening, of the monopoly. The concept of copyright as a property (what Chafee refers to as 'excessive reification') and the tendency of the UK law to be fairly firm about property rights leads me to this conclusion. Further, there has never been any prospect of the exceptions allowed in sections 6 and 7 being extended outside the narrow confines of places (certain kinds of library) and types of materials (literary works, such as books and journal articles) to include new formats, such as films, records, etc. The Green Paper does not mention such extensions. As you all know, there is controversy as to what may be done about copying in 'commercial organisations', and whether it is possible or reasonable to differentiate such organisations from their collaborators in the public and educational sectors. Also as to what 'business ends' may be, and of course how reprographic copying can be policed in private organisations. I have already referred to Aslib's response to the Green Paper, which takes issue on these points.

In spite of what I have just said about the protective nature of our law—protective of the monopoly, that is—I think that in the context of the international nature of document delivery services one has to bear in mind the situation in other countries, where the concept of public good, and of judicial interference in the interest of the public good, may be actualities. To return to the question of closed user groups, we have always had closed user groups in fact, if not in name. Expensive reports compiled by market research companies are drawn up for small numbers of clients. Confidential materials in organisations of any kind may have restricted circulation. On Prestel we now see closed user groups of those who are willing to pay for access to information which is exceptionally expensive to provide. Publishers questioned as part of the HERMES Project[17] were split in their opinions about the effectiveness or desirability of closed user groups for document delivery services. Outside our own jurisdiction I would advise caution. It may be (and this is all highly speculative) that governments and judiciaries may come to view the consolidation of information publishing and distribution services into a few hands with alarm. It may be that document delivery and full text services will make access to information easier and quicker for that who can afford them, and harder for the rest. It may be that this will be regarded as an excessive protection of the copyright monopoly. The role of closed user groups in services which store and deliver a wide range of materials, on many subjects, at varying levels of presentation may be regarded as against public interest. Their use would merely draw attention to the need to modify the copyright monopoly, and so they would be, in the long run, ineffectual protective mechanisms.

The EEC is developing anti-trust law, and the USA already has it: all monopolies should be examined in the light of such public legislation.

5. *Refusal to stifle independent creation*

It may be a little previous to attempt to discuss this point, before we have seen what effect document delivery services may have upon writers regarding their incentives to create materials to put into the systems, and also regarding changes in their relations with publishers. Most researchers and academics are anxious to have their ideas disseminated. We have seen that some are prepared to pay for publication. I realise that we all hope these systems will improve the dissemination of materials, and that publishers will continue to require authors to write works to be disseminated. I think that all I can say at this stage is that we should guard against storage and delivery services which become exclusive, for financial or any other reasons. What will the author do who cannot get work accepted by publishing and delivery consortia? Will small publishers be able to negotiate fair arrangements for their materials on these systems?

6. *Legal rules which are convenient to administer*

Chafee had in mind the administration of justice when he came to this heading, but I will misuse his list, and consider licensing and royalty systems at the private contract level. It is notorious that the Copyright Clearing Centre in the USA had not been successful—publishers do not register, and librarians to not notify the CCC of their copying. Licensing systems must be easy, convenient and apparently fair to all parties, but especially to the end user who will be the first and best placed to by-pass them. The chain of distribution is now every long, and document delivery and full text systems, although quick and accessible, will be administered from a distance. The further away the people operating the systems, the more likely are the recipients to regard the systems as impersonal, and therefore fair game. We have within the ambit of the UK copyright law—in music publishing and performing rights—examples both of licences granted by direct arrangements between copyright owners and users, and of public licensing bodies. That music licensing is highly idiosyncratic, and that some of its idiosyncracies are fathered by the nature of copyright in music as evolved in the UK, is apparent if one examines the subject on even a superficial level. Whatever licensing schemes are worked out for document delivery systems they, like the schemes for music, will have to have regard for the national and international systems they encompass. The changing nature of information storage, retrieval and delivery systems, changes in user behaviour, and the balance that may have to be worked out between voluntary submission to licensing requirements and the payment of royalties by recipients are further variables which new regulatory systems must allow for. The problem of policing intrudes here also. The kinds of licences envisaged by the Wolfenden Committee appear to me to be very 'hostile' and a carry-over from the trench warfare on reprography. I hope that the document delivery and full text service suppliers will be able to free their licences from this unfortunate inheritance.

Final comments

I would like to end with one last quotation. I realise that this paper has cited several documents, but this is not another example of regulatory drafting. You may find it alarming or cheering, depending upon your place in the chain of information distribution.

> 'You must imagine, at the eventual heart of things to come, linked or integrated systems or networks of computers capable of storing faithful simulacra of the entire treasure of the accumulated knowledge and artistic production of past ages, and of taking into the store new intelligence of all sorts as produced. The systems will have prodigious capacity for manipulating the store in useful ways, for selecting portions of it upon call and transmitting them to any distance, where they will be converted as desired to forms directly or indirectly cognizable, whether as printed pages, phonorecords, tapes, transient displays of sights or sounds, or hieroglyphs for further machine uses. Lasers, microwave channels, satellites . . . and, no doubt, many devices now unnamable, will operate as ganglions to extend the reach of the systems to the ultimate users as well as to provide a copious array of additional services.
>
> 'Copyright is likely to recede, to lose relevance . . . copyright or the larger part of its controls will appear unneeded, merely obstructive, as applied to certain sectors of production, and . . . will lapse into disuse and may disappear.'[18]

This was written twenty years ago by Benjamin Kaplan, in a series of lectures delivered at Columbia University. He hypothesised that copyright might fade away in the area of scientific and technical publishing, because he thought that it was possible that waiver of copyright by the American government for all publications resulting from projects it funded, wholly or in part, would weaken the demand for its protection by researchers. I do not think he saw copyright disappearing from the world of the creative writer, artist or composer. His idea of the shape of things to come has not come to pass, but I think his picture of the future, admittedly written tongue in cheek, should be re-read from time to time, as a reminder to writers, publishers and users that the copyright monopoly is not god-given but man-made.

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User Needs and Technology Options for Electronic Document Delivery

Yuri Gates
Pira, UK

Paper presented at the Aslib conference 'New approaches to document delivery: systems, services and their implications', London, 22 November 1982

Introduction

THIS PAPER OUTLINES a study recently completed by Pira for the Publishers Association and the Directorate-General Information Market and Innovation, DG XIII, Commission of the European Communities, on the relationship between user needs and technology options for electronic document delivery. Since it is impossible in a short paper to cover all aspects dealt with by the study, the intention is to concentrate on those matters most likely to be of greatest interest to librarians. Those interested in full details should consult the published report.[1]

The increasing volume and complexity of scientific and technical literature has already made it impossible for most librarians to purchase all the books and periodicals likely to be needed in their libraries. Present budgets are tightly stretched and the situation is unlikely to improve since the publisher is contending with the escalating costs of paper, labour, warehousing and distribution. Also, in some cases, the number of copies of a publication sold is declining because users cannot afford to buy, or because photocopying is a cheaper, quicker and more convenient alternative.

Some of the problems might be alleviated by using electronic systems instead of the traditional paper-based ones. A number of factors favour such a change. For example, authors are beginning to use word processors or personal computers for preparing manuscripts, thus capturing words in machine-readable form on floppy discs. In universities, where mainframe computers are available, some academic authors already have access to sophisticated text processing systems. Librarians and information scientists too are turning to computers to aid and enhance their work and online information retrieval systems are becoming much more widespread.

Information technology itself is becoming more versatile, more user friendly and cheaper. It is also becoming more commonplace as office automation proceeds.

The national and international environment is favourable, with governments encouraging the development of information technology and supra-national bodies tackling the problems of standardisation so that the maximum benefits can be derived from the new technologies.

The Directorate-General Information Market and Innovation, DG XIII, Commission of the European Communities, has brought the problem of document delivery strongly into focus by commissioning the Franklin, Artemis and Steria reports. At the same time, publishers in the private sector have been assessing the market for document delivery services and the Publishers Association of the United Kingdom has been responsible for the commissioning of a market feasibility study.

DG XIII and the Publishers Association of the United Kingdom jointly commissioned this further study to investigate the relationship between user needs and technology options for electronic document delivery. Specific objectives were:

(1) To undertake a literature search to provide a useful list of items for background reading.
(2) to assess users' needs for a document delivery service.
(3) to establish whether there were any trends in the use of alternative (non paper-based) media in the publishing industry.
(4) to establish whether the publishing industry was able and willing to operate a document delivery service.
(5) to review technical mechanisms for document delivery and identify features relevant to users' and publishers' needs.
(6) to assess the various technology options against users' and publishers' needs, in order to select the most promising systems.
(7) to make rough estimates of the costs of the selected systems in order to establish whether they were likely to be economically feasible.
(8) to attempt to establish a framework for a document delivery service which would be suited to users' and publishers' needs.

Literature search

The literature search was done in two parts covering (1) factors relating to the market for a document delivery service and (2) electronic mail. Extensive use was made of online databases and the resources of several major UK and European libraries in order to gain wide coverage.

The impression gained from the literature was that little work had been done to study the market for electronic document delivery services in the field of scientific and technical literature; also that, although a few experiments had been undertaken, no commercial systems based on books and journals supplied by publishers were in existence.

User survey and interviews

The user survey was undertaken in three parts:

(1) by postal questionnaire
(2) by personal interviews
(3) by discussions with representatives of user organisations.

It was considered inappropriate to draw up a precise specification for a document delivery service at the commencement of the survey, since there was no pre-conceived idea of what the user needed. This meant that the concept had to be expressed in a general way as a service using new technology which could help speed the flow of published documents to the user.

Because the problem of document delivery appeared to have arisen soonest in the scientific, technical and professional fields, an attempt was made, in selecting questionnaire respondents and interviewees, to concentrate on those working in these areas. At the same time, the variety of organisations from which they were drawn was made as wide as possible. A further aim was to have an 'information conscious' sample of people who would be likely to have views on document delivery services, rather than a statistically balanced one.

The types of documents about which comments and reactions were sought were primarily books, periodicals and abstracts, but comments about other kinds of publications were noted. In addition, comments on alternative formats to traditionally published documents were sought.

The postal questionnaire and personal interviews were conducted in the UK only. The discussions with representatives of user organisations took place in France, the Netherlands and the UK

The user survey and interviews covered: frequency of use of books, periodicals and abstracts; library budgets; preferred formats for documents; requirements for timeliness; price; attitudes towards copyright; subject interests; methods of obtaining documents; difficulties in obtaining documents; level of satisfaction of need for documents; usage of online information retrieval services; essential features of a document delivery service.

A total of 540 replies were received to the questionnaire. Following the analysis of the results, 43 full length personal interviews of librarians, information officers, information scientists and users of library and information services were conducted in order to probe in greater depth into the needs for and attitudes towards document delivery services. Discussions were also arranged with representatives of seven organisations concerned with libraries, information dissemination centres and online users, in order to obtain an independent check on the validity of the results of the questionnaire and to gather additional information.

It was concluded that, although the initial European demand for electronic document delivery was comparatively small, there was considerable latent demand, especially in industry. The most popular features of such services would be:

(a) comprehensive range of documents available from a single source
(b) ability to view information immediately on a terminal
(c) ability to order via a terminal
(d) ability to check availability and price of documents quickly.

Of the librarians who responded to the questionnaire, 67% mentioned delays in delivery as a cause of difficulty in obtaining documents, while 33% mentioned documents being out of print. Users of libraries were on the whole satisfied with the timeliness of documentation services they received, but it was noticeable that their expectations were not particularly high. However, over 82% of all respondents to the questionnaire said that it would be worth paying extra for the special, rapid delivery of an important document.

Publisher survey

The publisher survey was undertaken by means of a postal questionnaire and personal interviews with UK firms concerned with publishing scientific, technical, medical and professional books and/or periodicals. The results showed that the publishers were willing to set up and operate a document delivery service if this was economically viable. Since the investment and risks involved were too big even for a very large publisher, the formation of publishers' consortia was taking place. Smaller publishers were also interested in participating and, indeed, their input should not be ignored, because the success of a document delivery service would depend on its comprehensiveness of coverage.

Computer typesetting tapes will be the main machine-readable form in which publishers will be able to supply the text of documents to an electronic document delivery service, at least initially, though OCR and word processing techniques will be increasingly used. An increasing number of authors will prepare manuscripts in machine-readable form.

Technical mechanisms for document delivery

The range of technology available for use in the various parts of an electronic document delivery system is vast, both in quantity and type. It is developing rapidly, with new systems and equipment being announced virtually every week. In the time allocated, it was impossible to make a complete survey of all the systems and equipment that are available now or likely to be available within the next few years, so an attempt was made to select the major categories, with some types and examples. Emphasis was placed more on the special features and advantages or disadvantages of the particular technology rather than on technical detail.

Data capture

Appropriate methods for text-only material include the massaging of typesetting tapes or machine-readable word processor output, the use of multifont OCR (for already printed material), or rekeyboarding if this can be cheaply done. Laser and CCD array scanning are suitable for the rapid digitisation of both text and graphics and for digital optical recording.

Storage media

Magnetic tapes, magnetic discs and digital optical discs are the most relevant storage media for document files, with the digital optical disc offering the greatest possibilities in the future. In a hybrid system, video discs or microforms could be useful, especially where graphics, including halftones and colour, need to be stored.

Systems

Online information retrieval systems making use of telecommunication networks are well established and some are offering or experimenting with full text document searching and retrieval. Users may have videodisc players linked to online systems to supply simple graphics.

Viewdata is more likely to be useful for document ordering, rather than document delivery, and its gateway facilities will increase its scope.

Automated microform systems capable of being accessed by a remote user have applications for both central and local use in certain circumstances, especially when graphics (including halftones) and colour are required.

Large electronic filing systems, especially those based on optical discs or virtual image processing which can store both text and graphics, offer potential for document mass storage. The development of local area networks in 'office of the future' applications will make it easier to generate and distribute information electronically.

Transmission

Digital methods are more accurate and therefore more suitable than analog for data transmission. Signals can be transmitted either along wires, cables or optical fibres, or through free space by means of microwaves, infra-red or satellite, but wires and cables have lower capacity than the other media. Both circuit switched and packet switched networks are available, packet switching being more efficient for transmitting intermittent data at various rates.

Teletex is suitable for coded-character transmission only, but is relatively cheap. Facsimile transmission can be used for both text stored in image form and graphics, but is relatively expensive. The proposed development of mixed mode transmission systems, combining a coded character system for text with a facsimile system for images, appears to offer considerable promise for document delivery systems. Wideband systems, such as optical fibres and satellites, are suitable for text and graphics, and may eventually prove to be reasonably economical, but have not been fully developed commercially in Europe yet.

Output devices

These may be used (1) at the document delivery centre itself, for documents to be despatched by post (if required); (2) at a local centre making use of portable copies of the document files; (3) by the end user. For the main or local centres, intelligent non-impact printers based on laser, dot matrix or possibly ink jet imaging techniques, could be used to give good quality reproduction of documents. For the end user, the selection of output devices is wide but likely to be severely constrained by costs.

The relationship between user needs and technology options

Over 80% of respondents to the user survey thought that a document delivery service should have comprehensive coverage at least in defined areas. This implied that a very large database would be required. With present technology, it would be possible to design a system large enough to hold, say, 5 years' issues of several thousand journals online. Older material, which would be less frequently used, could be stored on exchangeable discs. This archived material would be less readily accessible, but users would still be able to have delivery within a few hours, or overnight.

The documents required may contain text only, simple graphics (e.g. bar charts or graphs), line drawings, diagrams, halftones and full colour. Some text-only documents will contain structured text, i.e. text whose position on the page is important if it is to be comprehensible. Example are tables, material arranged in columns, cross-column inserts, running headings and footings, marginal notes and footnotes. The integrity of these pieces of text and their positioning on a page in relation to other text must be preserved at the printout stage to ensure that the meaning is clear. In scientific and technical documents, mathematical equations and chemical structures are likely to be important features too.

The documents could be handled either in coded character form or as facsimiles. Terminals suitable for receiving coded characters include:

Teletex terminals
communicating word processors
personal computers with communications facilities.

However, these are unlikely to cope with more than four sets of 94 characters. An intelligent terminal with a small microprocessor, and a store of two floppy discs or one Winchester disc, could be equipped to handle dynamically redefinable character sets, giving a much wider range of characters.

Simple graphics, line drawings, diagrams, structured text, mathematical equations, chemical formulae and low resolution halftones can be transmitted and received by office-type facsimile machines. The quality of the facsimiles will vary, depending on the number of dots per inch which the particular type of machine can reproduce. Small characters or symbols, such as superscripts and subscripts, may not be fully legible on some facsimiles. The technology to transmit and receive high resolution halftones and full colour is available—it is used in the printing industry—but it is too expensive for supplying a single copy of a document to a remote location. However, it may eventually prove economically feasible to transmit adequate reproductions of halftones to special high speed terminals using broad band techniques. Another future option could be the use of Group IV facsimile machines, which will transmit in mixed mode, allowing coded characters to be transmitted in Teletex mode and graphics to be transmitted in facsimile mode.

Document delivery scenarios

Assuming that publishers would not wish to set up a document delivery operation, based on a conventional store of printed or microfilmed documents supplied on demand by post or van delivery, there are three principal options:

(1) creation of a central file of documents in machine readable form. This file would be accessible to users via a telecommunication network. Alternatively, the documents required could be printed out from the file and supplied to the user by post.

(2) creation of portable files of documents using a storage medium such as a digital optical disc. Copies of the files would be distributed to local centres and/or large users for local access online or local printout.
(3) a hybrid of options (1) and (2) with some of the files accessible from a central computer and others available locally.

Whichever option is selected, provision must be made for the reproduction of both text and graphics (at least in black and white). An ideal system would also include facilities for colour halftone reproduction, but this is likely to be too expensive in the immediate future.

Six scenarios representing a reasonable, though not complete, match with users' and publishers' technical requirements, were drawn up:

(1) a Teletex system, suitable for documents containing text only. If graphics are needed, they must be handled by an auxiliary system.
(2) a facsimile system, suitable for documents containing text and graphics.
(3) a combined Teletex and facsimile system, in which the text of the document will be handled in the form of coded characters, while the graphics will be handled by facsimile techniques.
(4) a satellite system, suitable for text and graphics, making use of satellite transmission for the actual delivery of the document.
(5) a digital optical disc system, based on 'office of the future' technology, suitable for text and graphics. It is envisaged that both central and local document delivery services will be developed.
(6) a magnetic tape system, suitable for documents containing text only. It is envisaged that both central and local document delivery services will be developed.

Besides the hardware required, there will be a need for software (a) for converting a variety of different inputs to a standard format, (b) for handling orders, accounting, record keeping and similar functions, (c) for document retrieval from the files.

It would be advantageous to link the document delivery service with other online systems used by potential large users such as librarians and information brokers.

Economic feasibility

Rough costings were made of the six systems listed above in order to establish whether they were likely to be economically viable. The data for the costings were obtained by a variety of methods, including discussion with manufacturers, reference to published information and the use of costing models. Inevitably, also, a number of assumptions had to be made about the systems, particularly about their size and the demand that would be placed upon them.

Typical capital costs for a 400,000 document system might range from below £500,000 for a text-only coded character system to over £12,000,000 for a facsimile system offering rapid online access to text and graphics at a resolution of 200 lines/inch.

The greatest single expense for the user is likely to be the terminal, typical costs being £4,000–£8,000; unless more costly, high resolution VDU's are desired. However, the terminal could be used for general office purposes as well as document delivery, thus enlarging its range of application. Document transmission costs should not be prohibitively high—perhaps about 20p for a 5-page document transmitted at 1.2 kbps.

Framework for a document delivery system

A possible framework for a document delivery system is shown in Figure 1. A variety of options is given in order to satisfy as many of the requirements of users and publishers as possible.

It will be important when designing the input system, to look ahead to future user requirements, since these are bound to be revised upwards. For instance, higher resolution graphics will be demanded when terminals capable of handling them become cheaper and more readily available.

The coded characters and digitised image data must be organised in the document store so that maximum advantage can be taken of the features of particular storage media, e.g. magnetic discs—fast access; magnetic tape—lower cost. It will also be desirable to take advantage of mass storage devices as they become available, e.g. optical digital discs, without having to re-organise the database.

Documents will be transmitted to the user by Teletex, facsimile and/or mail, according to his choice. Document files could be copied onto magnetic tape or digital optical disc and transmitted to local centres by mail. Later they could be transmitted by satellite, if this proved economical. It would also be possible to store images in analogue form on microfilm/fiche or videodiscs, as a back-up for a text-only database.

Conclusions

Although the initial European market for electronic document delivery is comparatively small, there is considerable latent demand, especially in industry. Publishers in the scientific, technical, medical and professional fields are willing to establish and operate such a service if this is economically viable.

An electronic document delivery service could be set up based on current technological options for data capture, storage, systems, transmissions and output. Developments expected in the next 2–5 years will allow improvements in storage capacity, speed of data transmission, quality of output, ease of use, and cost reduction. Given certain conditions, the service could be offered at a price which would appear reasonable to potential users.

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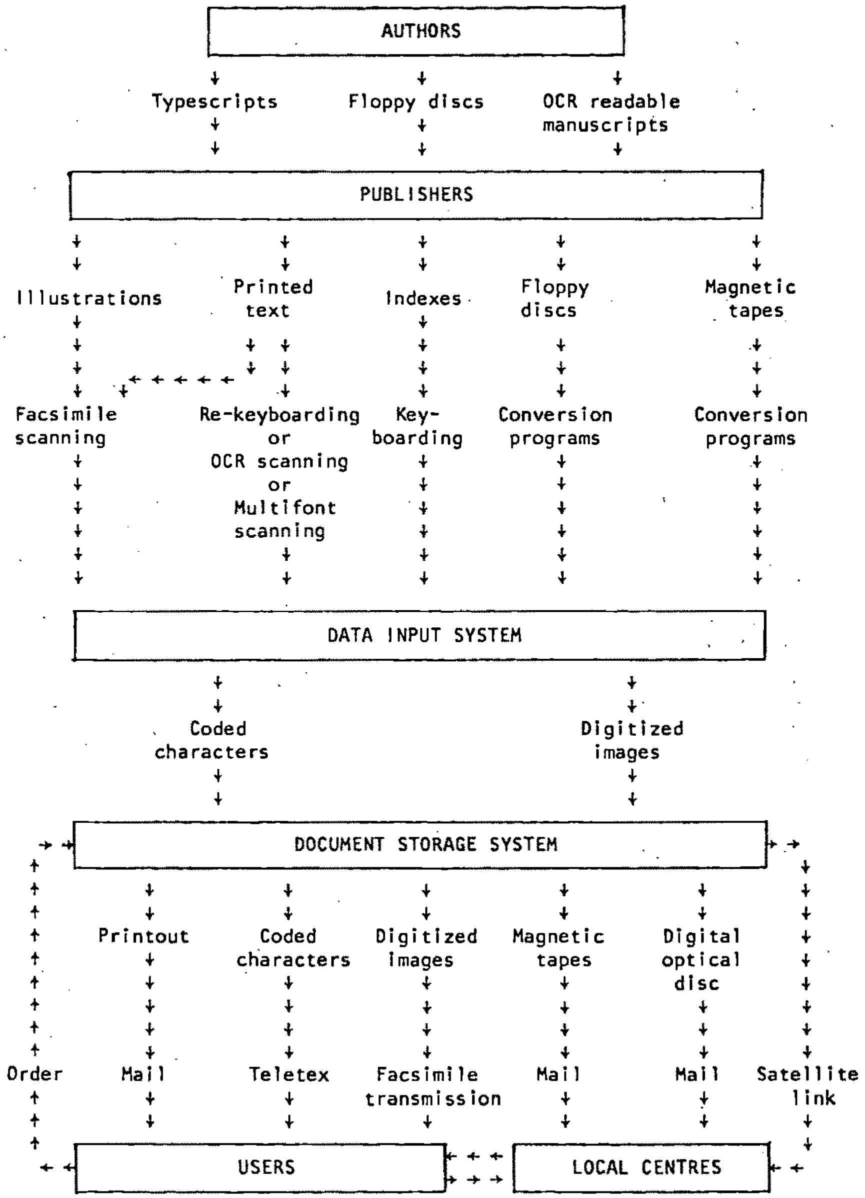

FIG. 1. *Framework for a document delivery system*

Discussion

The following points were made during the panel session:

1. It is important that figures are constantly monitored, since it is always difficult to verify statistics and provide accurate costs. Estimates of demand can also be deceptive and this can alter the final cost per document. Perhaps some form of independent assessment is necessary.
2. A coded character system is much cheaper than a dot matrix system for both storage and transmission. However coded characters cannot reproduce half tones. Even line diagrams are not completely satisfactory. Research for combining the two processes in a hybrid system is already under way.
3. The handling of copyright under the present law is very unsatisfactory. Copyright is a dichotomous concept—it is impossible to protect and give access simultaneously. Legislatory interference is not necessarily satisfactory as the case of Public Lending Right has shown.
4. The videodiscs which are available for the end user are created in chronological order when the journal is received and then indexed when the disc is full. The technology dictates that it is only possible to add to the information stored, and not to replace or overwrite. The user can then extract the information required.
5. It was argued that the scientific, technical and medical publishers in the ADONIS consortium constituted a monopoly which would create higher costs. However publishers are arguably a monopoly already and the project will be market-driven. ADONIS is still basically a *reprint* service—the text still exists in hard copy.
6. It may seem that the PTT's will be taking a disproportionate amount of income without corresponding risk. However, future developments in private communication systems—for example the Mercury concept—may alter this.

Letter to the Editor

IDENTIFICATION OF REFERENCES

The article by Martyn[1] on the problems of identifying multiple references to the same document in on-line searches suggests some interesting and practical solutions at a local level. Adkins[2] in his letter points out that an alternative approach is to tackle the problem at its source and to allocate a unique number, preferably when the document is published. Martyn's solution is both possible and practical. However, Adkins' alternative, although important in its concept, has one very serious disadvantage. The allocation of the ISSN/ISBN is a manual process and is consequently subject to human error. A better way and more in tune with new technology is to devise some means for the machine allocation of a control number. The work at Bradford University[3] over the last six or seven years has devised methods of doing this for bibliographic records of books, and the techniques that have been evolved and been tested over the years could be adapted for the creation of a unique number for a periodical article.

F. H. AYRES
Librarian,
University of Bradford

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SO YOU WANT TO BE A PRESTEL INFORMATION PROVIDER?

A manual of practical advice for providing local community information on Prestel

DAVID OLIVER
CATHERINE SULLIVAN
JOYCE BARR

The purpose of this manual is to give practical advice on creating an information file on Prestel. The authors' experience is based on some two and a half years' work with Prestel. A major part of their activities involved the operation of an 'umbrella' service, on an experimental basis, as part of research investigations supported by the British Library Research & Development Department. During this period, local community information supplied by six public library services in London, Birmingham and Norwich, was used to develop local files on Prestel amounting to some seven thousand frames, large by current Prestel standards. The information was entered at a central editing point in London (Aslib Research and Consultancy Division).

The advice given will be of particular relevance to organisations wishing to provide local information. However, certain ground rules apply irrespective of information content, and this manual should prove useful to other potential Information Providers (IPs). Those aiming to participate in a co-operative or 'umbrella' service on Prestel, whether a local authority, voluntary organization or private company, should find the information on the kind of arrangements required and problems involved especially useful.

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Interlending strategy for the future

Stuart Ede
British Library Lending Division

The Report of the British Library ad hoc *Working Party on Union Catalogues was published recently. The author, who is Head of Records at the British Library Lending Division and who acted as Secretary of the Working Party, provides a commentary on its recommendations and outlines the relationship between the proposed interlending strategy and the UK Library Database System. Progress towards the Lending Division monograph stock catalogue and the union finding list of foreign language monographs recommended by the Working Party are also reported.*

Introduction

INCREASING AUTOMATION of libraries has led to the wider availability of machine-readable information of libraries' holdings, and the growth of the co-operative shared cataloguing databases has provided easier access to that information. The new trends in interlending this might stimulate and the opportunities that might be opened up for improving union catalogue provision prompted the British Library to invite representatives of the Library Association, SCONUL, COPOL and the National Committee on Regional Library Cooperation (NCRLC) together with a number of other librarians prominent in interlending to form the British Library *ad hoc* Working Party on Union Catalogues. The Chairman was Henry Heaney, Librarian of Glasgow University.

The Working Party's brief was to examine the purpose and scope of existing union catalogues, to consider the implications for union catalogues of developments in library automation and to suggest possible future patterns of union catalogue provision. The brief was applied predominantly to monographs. After a year of deliberation the Working Party presented its Report in April. The British Library, having assured itself that it can make the necessary resources available, has accepted the recommendations wholeheartedly.

The Report was published at the end of 1982[1] and is available free on request from the Lending Division Publications Section.

Aslib Proceedings, **35** (5), May 1983, p.207–212. Printed in Great Britain

Recommendations

The Working Party's recommendations as stated in the Report are:

1. The Lending Division should create a machine-readable file of records of its English and foreign language monograph stock, which should then be made available as a COM catalogue, online and in ISBN form as part of the Combined Regional Locations List.
2. This file should initially contain records for items published after the date of its inception, and as much of pre-existing stock as is feasible. To simplify use the dividing line between old and new catalogue files should be drawn by date of publication.
3. When Lending Division stock appears in the Combined Regional Locations List, the possibility of distributing it to individual regional members and other libraries should be pursued.
4. The Lending Division should create a machine-readable Union Finding List of Foreign Language Monographs, which should be made available in COM form and possibly online. Libraries should be encouraged to use this finding list to locate items for interlibrary access.
5. The Union Finding List of Foreign Language Monographs should endeavour to maintain at least as good a level of coverage of material as the present Union Catalogue of Books. To this end it may be necessary to retain some non-automated contributors, such as the smaller specialist libraries.
6. The lending Division should investigate the possibility of adding records retrospectively to the Union Finding List of Foreign Language Monographs, where they are available in machine-readable form. As with the Lending Division stock catalogue the dividing line between the Union Finding List and the Union Catalogue of Books should be by date of publication.
7. The Union Finding List of Foreign Language Monographs should initially cover Western European language items wherever published, but the eventual aim should be to extend it to include Slavonic and East European language material. The Lending Division Slavonic Union Catalogue on cards could then be closed except for the recording of older items and serials.
8. In the light of the foregoing recommendations, the Lending Division should discuss with the appropriate bodies the union catalogue provision for Latin Americana, with the object of providing access to this material in the most economical and effective way. Central to these discussions should be the rationalisation of the British Union Catalogue of Latin Americana with the proposed Union Finding List of Foreign Language Monographs.
9. No immediate changes are required regarding the Union Catalogue of Asian Publications (UCAP), but it is recommended that the Lending

Division initiate discussions with interested bodies with a view to seeing if there are viable alternatives to UCAP for satisfying the residual interlending demand for oriental language monographs.

10. There should be no specific action taken to record notifications for current Third World English language monographs.
11. Libraries contributing to union catalogues and planning automation of their cataloguing systems should make adequate allowance for the generation of notifications. This will involve consultation with the British Library (and other appropriate bodies maintaining union catalogues) in the early stages of design.
12. The Lending Division should take all reasonable steps to encourage user libraries to send to the Division requests for items they have not found in the Lending Division stock catalogue or the Union Finding List of Foreign Language Monographs, in order to ensure that the Division can continue to monitor demand and be responsive to it.
13. Implementation of the proposed strategy for union catalogue provision for interlibrary access should be co-ordinated with the shared cataloguing activities of the Cooperative Automation Group with a view to working towards as close integration as possible of the two functions.
14. The record structure adopted for the Lending Division stock catalogue and the Union Finding List of Foreign Language Monographs should be MARC compatible, but the content need be no more than is required for interlibrary access.
15. It is recommended that work should commence as soon as possible on development of the proposed stock and union catalogues and on the internal systems required to build and exploit them at the Lending Division.
16. The implementation of these recommendations should be kept under close review. The Lending Division Advisory Committee is felt to be the most appropriate body, and it has agreed to accept this role.

Lending Division monograph stock catalogue

The purpose behind publishing the Lending Division monograph stock catalogue (recommendations 1 and 2) is to counter a potential trend towards direct interlending between individual libraries of items held by the Division. In the main this stock comprises high use, research, higher educational and equivalent material (predominantly English language monographs). The Working Party could foresee that, because location information is becoming increasingly available through shared cataloguing databases, and because at present application to the Lending Division has to be done speculatively (albeit with a good probability of success), direct interlending of this high use material might be stimulated.

This was viewed as undesirable, because the larger libraries would soon become overburdened. Interlending would compete with their own users' demands, and because the Lending Division form covers only the direct costs of libraries they would not be able to support the increased level of demand. As a result they might restrict access to their collections, for example by punitive charging as is happening in North America. Not only would this make unavailable much unique material for which direct interlending is the only source, but the shift in demand could also harm the Lending Division's acquisitions and services (even though the trend might eventually be self-correcting). Publishing the Lending Division monograph stock catalogue on computer output microfiche (COM) and providing online access to it are intended to protect the larger libraries and to ensure the continued availability of high use monographs by utilizing the central collection effectively. At the same time direct interlending of material for which acquisition for a central collection is uneconomic can proceed unimpaired.

The proposal to enhance the Combined Regional Locations List with Lending Division holdings is very much in keeping with the principle of discouraging direct interlending where it is harmful but encouraging it where it is necessary. Direct interlending is the main means of satisfying demand for fiction and popular non-fiction, but much higher educational material is acquired by regional members (predominantly public libraries), and this then appears in the individual regional lists that record members' holdings on COM by ISBN and other control numbers. The Combined List, which is an amalgamation of all the regional lists, is at present distributed only to regional headquarters to prevent indiscriminate use. The appearance of Lending Division stock locations in it will open up the possibility of distributing it more widely (recommendation 3), though it is recognized that safeguards may still be needed against the uncontrolled routing of inter-regional requests. The scope for development of the Combined List is being explored with the regions.

Union finding list of foreign language monographs

This finding list is intended to capitalise upon the increasing volume of machine-readable records available from libraries that are actual or potential contributors to the Union Catalogue of Books, a card catalogue maintained by the Lending Division, which at present is the prime tool for the interlending of foreign language monographs. Publishing the finding list on COM will allow libraries to obtain locations for themselves without having to apply first to the Lending Division (recommendations 4, 5 and 6).

Special materials

The finding list will initially be for monographs in non-slavonic European languages (wherever published), but the Working Party foresaw that it could eventually be extended to slavonic language monographs (recommendation 7), replacing the Lending Division's Slavonic Union Catalogue. This will depend on the future ability to handle cyrillic script at reasonable cost.

The creation of the finding list will open up the possibility of rationalization with the British Union Catalogue of Latin Americana (recommendation 8), which is maintained by the University of London Institute of Latin American Studies (ILAS). While BUCLA covers a wider field than will the finding list, there is considerable overlap in coverage and in the lists of contributors involving a degree of dual notification. The Lending Division will be exploring with ILAS, in consultation with other interested parties, the scope for a more co-ordinated approach to the provision of locations for Latin Americana.

Recommendation 9, that alternatives to the Union Catalogue of Asian Publications (UCAP) should be investigated, stems from the very high unit costs and low success rate of UCAP in locating items not found in the School of Oriental and African Studies collection, which is the primary backup library for oriental language material. Automation does not offer any hope for the future as few contributors are intending to automate and in any case there are daunting problems associated with the variety of scripts and transliteration schemes. A survey of demands on UCAP is currently being analysed with a view to establishing the feasibility of setting up rotas of libraries for the circulation of requests. Worthy of note in this context is the new scheme under which the British Library Reference Division Department of Oriental Manuscripts and Printed Books now lends oriental language monographs as a last resort. The question of rotas will be discussed further with interested parties. This is essentially separate from the LASER and NCRLC initiatives for the interlending of ethnic minority literature, though they will be followed with interest.

Interlending on the UK Library Database System

The publication of the Working Party Report is very timely in view of the recently publicised proposal by the Co-operative Automation Group (CAG) to set up the UK Library Database System (UKLDS)[2]. Whereas the initiative for UKLDS stemmed from the desire of the British Library and the cooperatives to share cataloguing records more effectively, it has great potential for interlending. The Working Party was aware of the CAG deliberations and recognized the importance of co-ordinating the development of the strategies for shared cataloguing and union catalogue provision (recommendation 13).

The UKLDS will be used for interlending in several ways. First it will be the vehicle for providing online access to the LD monograph stock catalogue. Secondly it will be a major source of location information for the union finding list of foreign language monographs. And thirdly it could be an online union catalogue providing access not only to the above material, but also to material for which specifically designed union catalogues are not cost effective (see recommendation 10 concerning Third World English language monographs), but which might find its way onto the UKLDS as a by-product of the cataloguing process. The detailed design of the UKLDS is being discussed within CAG and there are still many aspects of its interlending function to be resolved. It is expected that the UKLDS will begin operation in about two years from now.

Progress towards the new interlending catalogues

A large minicomputer system is required at Boston Spa to support record creation, updating and publication of the stock and union finding list files, together with online access for internal request checking. The opportunity will also be taken to integrate the Lending Division's acquisition operations into the system. A team had been preparing a specification of the operational requirement for the Monograph Acquisitions and Records System (MARS) in parallel with the Working Party's deliberations. This enabled the detailed discussions with potential suppliers of the hardware and software to get off to a flying start.

It is hoped that the basic system can be delivered in spring 1983 to permit development work, trial running and file building to proceed during the remainder of the year, with the aim of implementing the first phases of the system at the beginning of 1984. The first issue of the monograph stock catalogue should appear by the year end. The timetable for the union finding list of foreign language monographs is more dependent on that of the UKLDS, and the COM version will probably appear about a year later.

Conclusion

The Working Party has proposed a strategy for the future that should be of great benefit to all libraries participating in interlending. The Lending Division will consult with interested parties on implementation of the recommendations where appropriate, but the main proposals are for new catalogues, which the Division is seeking to realise as quickly as possible within its present resources.

Finally a word of thanks is necessary to those librarians who served on the Working Party and who achieved a remarkable degree of consensus in formulating their recommendations. This consensus adds much weight to their assertion that 'these proposals constitute the minimum requirement to maintain an effective and efficient interlending system for the future'.

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Meanwhile in West Germany. . .

Blaise Cronin
Aslib Research and Consultancy

Introduction

THE EFFECTS of economic recession on the nationwide provision and development of library and information services has been the dominant theme for professional discussion and debate in the UK for the past decade. It would be wrong to suggest that policy makers, practitioners and researchers, any more than the end-users of information services, have in any sense reconciled themselves to the inevitable frustrations, contractions and occasional contradictions forced on them by this state of affairs. Nonetheless, to an outsider it might just seem that the profession has, in some respects at least, displayed a remarkable capacity to adjust to prolonged tribulation. Perhaps one of the keenest ironies of this enforced siege mentality has been the fact that recession has been counterpointed by a veritable revolution in the technologies associated with information processing and handling. The silicon chip has invested the gloom of recession with any array of (at times) ambivalent possibilities for a profession which for more than a century has slowly, and of its own accord, refined an inherited corpus of traditions and functions. The transformations demanded by the new communication technologies have provided the library/information profession with a twin-edged challenge: the need to react to financial pressures, and the need to understand the long-term structural upheavals precipitated by the new technology. Adjustment, therefore, requires more than a set of graduated and gentlemanly responses; it requires far-reaching, and often painful, changes in a long, undisturbed tradition of service and in the education processes and mechanisms associated with that service.

West Germany and the recession

Such is the nature of global recession that its reverberations are experienced differentially (at least in the initial stages), and it is really only in the last few years that the German Federal Republic has discovered that it is neither privileged nor in any way immune from the effects of generalised economic downturn. This realisation has begun to colour the thinking and actions of the West German library and information communities. Belatedly, but no less seriously, the consequences of recession have started to take their toll.

Academic and research libraries are suffering cuts in their acquisition budgets of between 30% and 70%, and in many instances vacant staff positions remain unfilled. The effect of these measures is to seriously impair the service capability of major public and educational institutions, to curtail technical

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experimentation, and, more specifically, to place unacceptable strain on existing document delivery systems. Perhaps the most seriously affected area has been periodical subscriptions, for here the loss in spending power has been accompanied by sharp increases in subscription rates (averaging out at 45% for North American journals in the last 12 months). Simultaneous pruning and cancellation of non-core titles means that the various regional and supra-regional inter-lending schemes are being asked to cope with unreasonable levels of demand, which in turn means greater queuing times and increased user frustration.

In the public library sector there have been severe reductions in book budgets, opening hours, the number of service points and in domiciliary coverage. More fundamentally, one sees confused attempts to develop appropriate survival strategies. This unpleasant situation is exacerbated by the country's growing unemployment level. West Germany's rate of unemployment is now greater than that of the UK and it has special problems associated with its population of more than 4 million *Gastarbeiter.* This double dilemma has given birth to the realisation, previously little recognised, that public librarians may have an important social role to play. Confusion thus arises from the need to reconcile this new mission with the widely held conviction that the library's primary function is to assemble and preserve a balanced and worthwhile record of human knowledge, irrespective of prevailing public taste and fads. In West Germany, need fulfillment has traditionally taken a back seat to a preservationist philosophy. Such a state of affairs would be anathema to many UK librarians, but it is important to remember that German public librarianship has a quite different character from that in the UK, or for that matter in North America. Consumer sovereignity has never been the guiding principle of West German librarianship, and in the present conservative climate it is even less likely that such a 'pandering' philosophy could take root. One suspects that many German librarians would agree (even if only in private) with the recently expressed view of an American library commentator that 'just as the increased sale of junk foods weakens us physically, the increased circulation of schlock diminishes us intellectually'.

On the one hand politicians make and endorse statements such as, 'Wenn arbeitslos dann lesen', and on the other take the unusual, and somewhat contradictory, step of decreeing that public libraries will henceforth levy charges. Of course, the levying of membership (and/or borrowing) charges is little more than a symbolic gesture (at a time of belt-tightening it is inappropriate to encourage public subsidy for services which, arguably, could and should be part-financed by the individual), and, anyway, the revenue generated is probably less than the cost of administering such schemes. Yet this is what is beginning to happen, and worse, there is no apparent standardisation in the policies and practices of the various *Länder*, so that what applies in one State does not in another.

Recession, it would appear, has caught the library profession on the hop, and in the place of carefully conceived adaptive strategies one finds a variety of *ad hoc* responses. However, it is true that many librarians are aware of the fact that their responses are less clearly elaborated than they would like, and it is possible that in the course of time more consistently reasoned responses will evolve.

This is the backdrop against which all current trends and projected developments have to be viewed. A visitor will, of course, still find much of interest; much to arouse enthusiasm and admiration (such as the on-going project to establish a computerised national union catalogue of periodicals which should eventually permit online document ordering), but the overriding impression is of a profession somewhat confused by recent events and lacking a consensual strategy to cope with the unpleasant and unexpected. So much of what was envisaged in the early and mid seventies seems unlikely to come about in the near future. There is, for example, a feeling that the momentum generated by the government's Information and Documentation Programme (1974–1977) will be dissipated by the lack of finance, and, in some quarters, there is a belief that ODIN (the concept of an integrated West German information retrieval and document delivery network embracing libraries, information centres and the book trade) may not quite live up to expectations.

The research programme

For the West German library and information communities the sixties and seventies represented a period of almost phenomenal growth. With typical German thoroughness the foundations of many impressive and ambitious schemes were laid; schemes which were to carry through to the eighties. The untimely advent of global recession has meant that some of these schemes were stillborn; that others may never come to fruition. West Germany, unlike the UK, has not had the (doubtful) benefit of a gradual introduction to the politics of recession, and, consequently has had to make even sterner adjustments in a shorter period of time. There is a belief among many concerned planners and practitioners that the long-term effects will therefore be more serious than may be the case in either Britain or North America. A country which has a fledgling information and library infrastructure is, arguably, more disadvantaged at a time of recession than one which has long-established national tradition. Furthermore, in some quarters there is a view that superficially important and powerful agencies, like the DBI (German Library Institute) and GID (Society for Information and Documentation) are not quite providing the sort of support, guidance and leadership most needed by the profession. However, it may be that this is more properly the role of the many professional associations.

Interestingly, neither the DBI nor GID could be said to have suffered as a result of the prevailing financial situation. Both organisations reported increases in their operating budgets for the present financial year, although these increases were marginally exceeded by inflation levels. Nonetheless, it is instructive to note that the DBI, which essentially manages, rather than conducts, its research programme has a staff of approximately 70; GID, a staff of more than 200. In addition the library research section of the DFG (German Research Association) has 24 staff members. When one considers that the bulk of funded library and information research in the UK is commissioned and superintended by one agency (BLRDD), with a professional staff of 17 and a project budget of approximately £1.3m, then one cannot but wonder why these three agencies (DBI, GID, DFG) do not exert a greater influence on developments within the library/information world. (The DBI has a research budget of DM 7m, while GID's 'special projects' budget is currently DM 8m).

Perhaps the single most appealing answer has to do with the political structure of the country, which makes centralised intervention and direction at times impossibly difficult. It may also be the case that these three bodies, to a greater or lesser extent, are handicapped by the traditions which define the domains they are trying to influence, and, further, it may be that the German approach to research (and research sponsorship), hallmarked by thoroughness and caution, is less likely to produce particularly imaginative or cost-beneficial results. That is not the same as saying that the overall quality of the research is any less impressive than in other countries; indeed, it is very often this care which confers on the resultant product its credibility.

Apart from sponsoring research (and in the case of the GID many other cognate activities), the DBI and GID see themselves as having a national role as information sources for the profession, offering advice, guidance and referral whenever possible. At GID this role is clearly articulated, and among the services and facilities on offer are the specialized information centres, the German online information centre, a national library covering information science, plus GID Kolleg, which aims to inform, refresh and educate information and subject professionals. The role of the DBI in acting as an informal ear for the profession's problems is rather less clearly conceived, and there is a measure of practitioner dissatisfaction with the organisation in terms of what it actually offers the profession. It may be that the DBI has a rather weak marketing profile (certainly by comparison with GID), but steps are being taken to give the organisation a sharper public image. In other respects the DBI is trying to open up its activities and involve the professional community in setting and shaping the research programme. To this end it has more than 20 committees covering a wide range of subject-topic areas, and interested and informed practitioners from all sectors of the library world are invited to sit on these for periods of two years at a time (with the possibility of one renewal). Some of the DBI's problems may lie in the fact that it has to cover the needs and requirements of both public and academic-research libraries. In Germany one still detects a measure of suspicion or distrust between the two wings of the profession, and it may be that these 'political' differences complicate the evolution of a truly balanced and co-ordinated research programme. As far as communication between the DBI, GID and DFG is concerned, there is nothing to suggest that they do not have a clear, shared understanding of how the 'patch' should be divided.

Use of computers

Another factor which strikes the visitor is the apparent underexploitation of computer-based technologies in the library community. This is surprising since (a) West Germany is a highly technologically developed country in its own right; and (b) since the intelligent application of computers can be a boon at a time of retrenchment. However, this 'anomaly' may be indicative of a wider lack of computer awareness, not just within the field of librarianship. Coming from the UK it is hard not to be struck by the poor the market penetration achieved by manufacturers of desk-top and home computers. This is reflected, also, in the relatively small number of computer magazines on newsagents' shelves. In West Germany there is a relatively low level of national interest in computers, and there is no government-backed scheme (such as MEP (Microelectronics Education Programme) in the UK) to stimulate a broad base of interest among the school population. It is difficult to know why this should be so, though it may in some small way be a consequence of the German tradition of compartmentalising education and professional activity (*ergo*, computers are for computer scientists.). It may also be that the virtual monopoly of the computer market by Siemens (with IBM very far behind in second place) has castrated individual and entrepreneurial initiative. An inventory of currently available I/R packages in West Germany would produce the following list: GRIPS, IBAS, HEBIS and BVS. A comparable list for the UK would be considerably more extensive, with many privately developed packages included.

As far as librarianship is concerned, one still detects a certain 'anti-computers' strain. There is, for example, hostility among some professional librarians and some unions towards the idea of *Bildschirmtext*, based on a fear that the functions of the qualified librarian will be taken over by machines. Often, the level of discussion fails to move beyond the irrational. Only slowly are the library schools coming to realise that DP and online may be an integral aspect of the professional librarian's *métier*. Berlin has a computer laboratory, Stuttgart is in the process of acquiring hardware and suitably trained staff and Hanover is training its staff in online searching, but Cologne, one of the largest schools, does not yet have facilities for teaching online. Due, perhaps, to the generally uneven level of development in this area, the activities of the *Lehrinstitut für Dokumentation* at Frankfurt in developing computer skills and novel training programmes for clearly targeted groups (such as media researchers, or industrial chemists), stand out. However, it should be said that many German librarians are conscious of the relatively low level of computer awareness in certain quarters, and are indeed very self-critical, but they will also point out that the tradition of library education has not been conducive to 'modernist' thinking!

Education and training

At the risk of overlooking or playing down examples of good practice, it seems to be the case that the education of library/information professionals in West Germany has not entirely shaken itself free from the tradition of professor turned librarian. There is still a strong emphasis on subject knowledge in many library courses (this ideal is enshrined in the *Höherer Dienst* tradition), on distinctions between librarians of different types (*Höherer Dienst, Gehobener Dienst, Mittlerer Dienst, Einfacher Dienst*), between librarians, information scientists and documentalists (which affects work roles, career prospects and operational flexibility), and still great emphasis placed on the book *qua* book. It is widely recognised that many of the traditions which impede development will disappear within a generation or so, and in this sense it may well be that most of the problems will be self-eradicating. But, there remains a lot to be done to make up lost ground.

In the last five or six years there has been considerable discussion of the need for, and feasibility of, integrated education for librarians, information scientists and documentalists. A great deal has been written; but the theory has also been put into practice in a number of library schools (Berlin, Cologne and Hamburg). It remains to be seen how successful these ventures prove to be in breaking down the career barriers and in conferring on documentalists professional respectability. One has at all times to remember that West Germany is a decentralized nation with, in effect, eleven independent governing units (*Länder*). Each *Land* is responsible for education, and is under no obligation to follow recommendations or policies proposed by the central government in Bonn. As a result, professional education for library/information work will vary in important respects from *Land* to *Land*, reflecting the needs, traditions and institutional framework of each region.

The most significant and imaginative research venture in this area has been the so-called FIABID project, perhaps the closest German equivalent of the Curriculum Development Project in the UK. Unlike the latter, however, FIABID concentrated on the desirability and feasibility of integrating education and training programmes for librarians, documentalists and information scientists, and the curriculum was discussed only in so far as it was necessary to establish areas of common interest and relevance. Fundamental questioning of curricula such as was stimulated and encouraged by the Curriculum Development Project, does not seem to have been considered necessary within the context of FIABID.

To grasp the importance of the FIABID project in relation to contemporary German librarianship and information work it is necessary to understand that the majority of librarians in the Federal Republic are employed as civil servants (*Beamter*). Documentalists and information scientists do not have *Beamter* status, and are very conscious of being the 'poor relations' of the library/information fraternity.

This has been a sore point for a long time, and one of the aspirations of the FIABID project was to encourage equal status and opportunity for all those engaged in library/information work. The FIABID project began by calculating the degree of commonality in the activities performed by the various breeds of information and library personnel. On the basis of its findings, it advocated the establishment of integrated education and training programmes, in the hope that this would be the first step to removing anomalies and equalising opportunities.

While there has undoubtedly been some success in converting good intention to basic practice, the rigid demarcations which existed (and still exist) between librarians have been applied to documentalists. So now, the *Lehrinstitut* is offering three types of course: one for *wissenschaftlicher Dokumentar* accreditation, one for *Diplom Dokumentar* and one for *Dokumentations-*

assistent. The main thrust of the integrated education programme has been at the level of *Gehobener Dienst* (graduate librarians/documentalists), but it may be that attempts will be made to harmonize the eduation of those at *Höherer Dienst* level. At Stuttgart where the emphasis is on training for public librarianship the syllabus now contains a compulsory unit on information and documentation, and there is a hope that in the future it may be possible to bring into the school those students who are at present being educated (for the *Höherer Dienst*) at the local *Fachhochschule für Verwaltung* (the training college for civil servants). This sort of educational separatism is somewhat alien to British ways of thinking, but it is a long-established and accepted feature of professional education and training in the DBR.

By popular agreement the most interesting experiments in integrated education are taking place at the Hanover library school, in a long-term pilot project jointly financed by the *Land* and the *Bundesministerium für Bildung und Wissenschaft*. Here, four distinct courses are offered (Diploma in Librarianship *or* Documentation without subject specialization; Diploma in Documentation with subject specialization and foreign language component; Diploma in Medical Documentation) with considerable overlap in course content, but sufficient specialization to give a clear identity to the course followed. Hanover has also broken with tradition by reducing the *practicum* (often two-thirds of a full-time course in librarianship or information science) and by developing the idea of co-operative project work. In a German context these changes are significant because they suggest that theory (or at least, theory linked to practice) may receive greater prominence in future curricula.

On the whole, professional library education in West Germany is very practice-orientated, and the schools see their role as providing manpower for specific operational environments. As a result, the tensions which seem to exist in the UK and the US between the teaching and the practising arms of the profession are much less in evidence in the DBR. One other factor which contributes to the reasonably healthy relationship between supply and demand is the regional character of professional education. Each *Land* sets its own regulations, norms and standards as regards candidate suitability and course content. Often, admission levels and candidate selection is determined by the regional board or department responsible for library affairs within the *Land* and not by the staff of the school. Empire building is therefore less likely to occur, since librarians and documentalists are being educated to meet the likely needs of the *Land*. Other factors which affect intake levels are *Numerus Clausus* (the quality-controlling ratio between staff and students), the number of placements for field work, the capabilities of staff and the resources within the institution.

These factors have tended to check over-production, though there are now some indications that a surplus of professionally-trained librarians exists. Certainly, there is a growing demand for places on courses (Stuttgart had between 600 and 700 applicants for the 150 places on its public librarianship course). However, the recent change in government may result in cut-backs in the German tertiary education 'industry', thereby effectively nipping a potential over-production problem in the bud. Another factor affecting uptake (one which has affected the *Lehrinstitut* in particular) is the difficulty of finding practical placements for would-be information science students.

Professional education for library and information work is changing in West Germany, but there is still a tendency to concentrate on local (i.e. regional) issues and requirements rather than the wider problems facing the profession as a whole. As indicated, this is largely due to the federated nature of government within the country. For this reason alone, one would have expected the KBA (Germany's equivalent of ABLISS) to have taken a strong lead in welding the various strands and setting the course for future developments, but this does not appear to be happening.

Financial limitations and their effects

Financial difficulties, outmoded traditions and decentralized government have combined to frustrate the enormous potential and desire for progress in the German library and information communities, but while planners and practitioners have learned to live with the second and third of these, they are unaccustomed to the first. Lack of finance affects the entire system from top to bottom. It has resulted in the introduction of fee-based library services in the public sector, and, by way of contrast, it has meant that institutions such as the Deutsche Bibliothek have been somewhat frustrated in their attempts to market their services and products as vigorously as they might.

Generally speaking, the bouyancy of the sixties and seventies has disappeared from the West German library/information scene, and optimism has been replaced by uncertainty. This uncertainty is perhaps best summarized by the present situation of GID. Despite its many achievements, there is a vague feeling that GID may not quite have lived up to its own, and outsiders', expectations.

The DBI, also, does not seem to have had the hoped-for impact, although, in fairness, it has only existed in its present form since 1978. Even in instances where the research initiative, planning and management have been exemplary, the level of take-up has been less than spectacular. For instance, the national symbol for libraries, and the attendant graphics package, have to date been adopted by only 5 per cent to 10 per cent of public libraries in the country. For many librarians the scheme is prohibitively expensive, and thus wholly irrelevant. But, of course, the problem of research up-take is a major problem for all funding agencies. Apart from considerable, if often laboured, progress in setting up regional and supra-regional networks and co-operatives (particularly noteworthy are mini OCLC-like schemes such as that based in Cologne serving a cluster of polytechnic libraries), much research and development seems to lack a clear sense of purpose and direction. One suspects that user education is passing out of vogue, for the very simple reason that the concept does not capture the imagination of many practising librarians. The distance learning project, which started so well, seems to be loosing momentum, partly because it is so expensive to run, and partly because (as is only to be expected) the *Länder* cannot quite agree on what is wanted. On the other hand, it is hard to understand why the DBI and the

DFG have neglected research into book selection and collection management, topics of acute interest to practising librarians everywhere at a time of budgetary cut-backs.

On the positive side, the DBI is currently co-operating with the *Deutsche Lesegesellschaft* and one of the national TV networks in launching a series of programmes designed to promote the use of books and libraries. A follow-up survey of the impact made by the series is planned by the DBI. Mirroring activity elsewhere in Europe, there are GID projects investigating information brokerage in Europe, and the size, structure and components of the West German information industry, while the DBI has just produced (in-house) and published an interesting report on 'Libraries and the information market . . .', which looks at the future role and place of traditional library services in an electronic context. It is surely symptomatic of something (though what, it is difficult to say) that a report such as this, with its 30–40 references, should not contain a single citation to the considerable literature which exists on this subject in both the US and the UK.

AUTHOR'S NOTE

This paper is based on a study visit to West Germany, financed by the Bibliothekarische Auslandsstelle (Berlin) and the British Library Research and Development Department. It does not pretend to offer a complete picture of current trends and developments, but aims to give some insight into the difficulties and challenges which confront the library and information communities in West Germany. The views expressed are, thus, very much those of the author, and are not necessarily those of either Aslib or the British Library. The assistance of the Bibliothekarische Auslandsstelle and the British Library are gratefully acknowledged, as is the co-operativeness and frankness of all those who gave so freely of their time in discussion.

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Some thoughts on the provision of courses in reading for industry

Ian F. Finlay

Freelance translator and language
consultant

There is a distinct need in British industry for personnel fulfilling a variety of functions, ranging from information science to distribution, who can read a variety of foreign languages within a given subject field. Specific courses of training catering for such personnel are largely conspicuous by their absence, added to which there would often seem to be a marked lack of realization of the need for them in both industry and those institutions which should be catering realistically for its real rather than imagined needs. This contribution, by a former industrial linguist, sets out to amplify this thesis on the basis of many years of practical experience.

Introduction

OF THE FOUR basic language skills, i.e. the ability to write a language, speak it, understand it when spoken by its native speakers, and read it, it is the latter which has been and still is most neglected, if not denigrated, often by those who might be expected to be making better provision for the real needs of British industry and those working in it. Even with the increased realisation that it is thoroughly legitimate to teach languages for specific purposes, there has not, as yet, been a sufficient application of this thesis to the reading skill, even though there are very many people employed in British industry for whom this skill is, to say the least, a desirability, if not a necessity.

It is important and necessary to stress here that those possessing such reading skills are not to be regarded as 'translators manqués' or people whose primary skill lies in the language field. On the contrary, they will primarily be experts in a wide variety of other disciplines, and at the same time experts with a secondary or ancillary skill, although at a professional level, which involves the ability to read material in one or more foreign languages related directly to the exercising of their primary skill in whatever non-linguistic field it may lie.

Such people are, from the writer's own experience, fairly rare in British industry today. Admittedly they do exist, but are, on the whole, conspicuous by their absence. This does not mean that they have never studied a foreign language or have not perhaps even passed an examination as a result of a

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course the aim of which was to impart a reading skill in, for example, French, German or Russian in a variety of scientific disciplines. On the other hand, their very inability to exercise this skill competently and confidently tends to place in question the effectiveness of many such courses. It would, however, be wrong to blame solely those who have attended such courses for their subsequent seeming inability to put the knowledge acquired into practice. There is, even now, no general conviction on the part of those responsible for employing people in British industry of the need or desirability to base their selection procedures, at least partly, on an ability to use foreign languages in a manner appropriate to their role in a firm. In an ideal world, there is no employee for whom some foreign-language knowledge or skill would not or could not be an advantage. This applies to everyone from the managing director to the commissionaire, not to mention such key-figures in this context as telephonists and reception staff.

Advantages of reading skills

Let us however return to the more realistic world and the main subject of this contribution, namely those employees for whom a reading knowledge of one or more foreign languages is, to say the least, a desirability for the full carrying out of their role within a firm. Foremost amongst them are the purveyors of information, i.e. those whose task it is to provide others with relevant sources of information. The main fulfillers of this role are librarians, abstractors and information scientists, many of whom, it must be admitted, do possess this reading skill, often more by accident than design, in so far as some librarians, for example, are modern language graduates who have turned to librarianship rather than, for example, teaching or translating. Such skills are often less commonly found amongst abstractors and information scientists, partly because some former research scientists have drifted into these roles for a variety of reasons.

Mention of research scientists serves to remind us that they represent another category of personnel for whom a reading knowledge of foreign languages can, to say the very least, be a distinct advantage. These people normally work in a fairly narrow and specialised field, at least at any one time.

Consequently, the ability to evaluate for themselves the potential relevance and importance of a given publication, be it an article or a patent specification, for their current research can be of great assistance. If the contribution appears to be of potential value, it can be passed to a professional translator for processing. It is even likely that the research scientist will be able to pin-point the sections of specific interest to him, thus saving both time and money. During my years as a translator I must have translated many articles which in fact turned out to be worthless to the customer (although even negative information has its value), merely because he was incapable of carrying out the initial evaluating exercise because of his lack of a reading knowledge of the language in which they were written. It would, on the other hand, be wrong not to draw attention to the danger of a little knowledge. The appearance of a given word in a publication might be construed, with a little knowledge, to imply that the whole publication was referring to its efficacy in a given context whereas, with greater knowledge, it might turn out to be stressing its unsuitability! I have also often received for translation reports in, for example, German in which the alleged English meaning of every tenth word or so had been written above it. Obviously, someone had been exercising their modest knowledge of German on the text. Often dictionaries offering strings of seeming synonyms had apparently been used with all the inevitable results thereof, added to which valuable time had been wasted. Needless to say, the often most troublesome elements in the text, i.e. abbreviations, were never translated!

Reference has so far been made to those employed in industry for whom a reading knowledge of foreign languages is virtually a necessity, i.e. librarians, abstractors, information scientists and, preferably, research scientists. Needless to say, there are many others, even if at a less crucial level. These include those working in patents, export, accounts, purchasing and distribution departments, for all of whom a reading knowledge of relevant foreign languages can be a distinct personal advantage, assuming of course it is of a reliable nature. Such knowledge can often enable such people to deal personally quite adequately with material they have to process while, in other cases, it can enable them all the better to brief the professional translator whose task it is to translate rather than evaluate. Lest it be thought that the latter would resent this briefing, it should be mentioned that he is usually so busy that he does not want to carry out unnecessary work. Assuming that he has confidence in his briefers, he would be more happy to meet their specific rather than general requests.

Acquisition of reading knowledge

Having now, it is hoped, stressed the importance of a reading knowledge of foreign languages to a number of categories of personnel working in industry which can, at its lowest level, be regarded as possibly the first rung on the ladder to a deeper and fuller study of those languages, it will be appropriate to consider the elements necessary for the acquisition of that reading knowledge. These are, in the writer's opinion, also in order of preferable importance and, therefore, acquisition:

(a) a basic knowledge of the country or countries in which the language is used coupled with a more detailed knowledge of the spheres in which it or they are important industrially. Such knowledge sets, as it were, at least part of the background against which the language should be studied.

(b) a basic knowledge of the way in which the language is pronounced. This can often be gained from learning the correct pronunciation of words already known in other contexts. Examples in German are the names of such famous people as Mozart, Heine, Schumann and Goethe. Such knowledge avoids confusing Vienna and wine (Wien and Wein), for example, added to which it lays a sound foundation for possible subsequent study of the more active aspects of the language in question.

(c) the basic grammar and vocabulary of the language. The view is sometimes expressed that technical language is completely different from everyday language, the implication being that the grammar, etc., is not the same in both cases. This may well be the case with Japanese, for example, but is certainly not for the majority of European languages. In other words, for whatever purpose a language is to be used, there is a certain corpus of basic material to be mastered such as common prepositions, adverbs, pronouns and verbal forms. To this must be added the elements of such matters as word order and agreement. Without this knowledge, which can perhaps best be described as 'recognition grammar', one is groping in the dark.

(d) the vocabulary specific to the discipline in question. This can be very much less extensive than is sometimes thought and can often be accommodated more effectively in a glossary rather than in a dictionary, even of a specialised type. It will be in rare cases only that this vocabulary need exceed a thousand words. For example, the number of words occurring in an article about the crimping of synthetic fibres will be very many fewer than to be found in a novel by Georges Simenon, this fact greatly facilitating the learner's task.

(e) awareness of additional aids in the form of, for example, parallel or bilingual texts, glossaries and dictionaries of the conventional or, in some cases, illustrated or pictorial type. Special mention should perhaps be made here of such invaluable aids as equivalent patent specifications and cover-to-cover translations of technical journals.

Of the material (a) to (e) outlined above, it is only (d) and (e) which are specific to a given discipline, (a) to (c) being common to the language as such, irrespective of the discipline involved. This provides the answer to my ideal for the acquisition of a reading knowledge of foreign languages within a given discipline, i.e. a series of books with the common elements (a) to (c) for each language involved coupled with specific elements (d) and (e) according to the discipline involved. This material should preferably be supplemented by a selection of relevant texts which would be highly annotated linguistically in order to explain fully the practical use of the written language. The books would end with a foreign language/English vocabulary covering the texts.

With, let us say, ten languages and ten subjects, there would be a hundred books containing partly common basic material, i.e. (a) to (c) above, and partly specific material, i.e. (d) and (e) above, supplemented in each case by specific texts and the vocabulary covering them. Thus we should have, for example, Danish, Dutch, French, German, Hungarian, Italian, Polish, Russian, Spanish and Swedish for, let us say, synthetic fibre technologists, dyers, paper-makers, accountants, dental surgeons and, bearing in mind that the arts, too, have their technical aspects, musicians and sculptors, to mention but a few possibilities. The range is infinite, once the principle has been accepted and the framework established.

The languages and subjects listed above are to a large extent arbitrary, but they do, individually and in their respective combinations, represent realistic requirements. A consideration of the present books available for imparting a reading knowledge of various foreign languages in a variety of disciplines, either in the class context or by private study, illustrates perhaps just how Utopian my ideal would seem to be. These existing books tend to concentrate on German and Russian, French—rightly in my opinion, at least in the general technical, and certainly chemical, sphere—occupying a very poor third place, while most other languages barely find a place at all. From the point of view of disciplines, 'science' in the widest sense of the word is usually as far as most go, with the exception of a few books directed more specifically to chemistry and social science.

Final comments

In a world which is fast becoming more and more interdisciplinary and in which national borders are becoming easier and easier to cross, there must be a decreasingly small place for the monoliterate individual. In other words, anything which can be done to break down the barrier of tongues, whether it shows itself by way of the written or spoken word, is to be applauded and encouraged for a wide variety of reasons, not the least of which is the making available of information and the utilization of it in an increasingly competitive world.

This contribution has been written from a severely personal, but hopefully practical point of view. It represents the distillation of experience in British industry extending over more than a quarter of a century, an industry which is only too often the place in which the follies of a traditional and unimaginative educational system come home to roost, not always by any means resulting in the production of either the proverbial chicken or egg!

FURTHER READING

1. FINLAY, IAN F. *Language services in industry.* London: Crosby Lockwood, 1973.
2. FINLAY, IAN F. *Which language shall I learn?* London: The Institute of Linguists Educational Trust, 1981.

Online library catalogue—Offline public access

David Buckle
Director, OCLC Europe

Paper based on a presentation given at an Aslib Evening Meeting, 28 October 1982

1. Introduction

THE INTENTION of this paper is to describe the mechanisms by which bibliographic data may be commonly created and utilised by an international library community. The paper is partisan in that it describes the mechanism developed by a particular 'not for profit' vendor of library services: OCLC Incorporated.

While catalogue cards continue to be the staple output product of the OCLC system, this is merely a reflection of the continued popularity of that output medium in the United States. Most of the libraries that have automated their cataloguing activities in the United Kingdom have in parallel opted for microform catalogue output and consequently abandoned the card. This paper briefly describes the microform approach developed by OCLC Europe, in response to this demand.

2. The OCLC online union catalogue

Currently OCLC services over 3,000 libraries throughout North America and a growing number in Europe. While most output services are offline, input and access is online. The shared services include catalogue processing, acquisitions and ordering, interlibrary loans and serials control. These shared online services are dependent on a bibliographic database of over 9,000,000 MARC (Machine Readable Catalogue) records. These records include the locations of each library holding that item: over 127 million holdings statements are available online; they are the key to interlending.

The shared online database may be accessed at any one of over 4,500 terminals connected to OCLC's dedicated international leased-line network and by many hundreds of other terminals using dial-access via public switch systems such as PSS in the United Kingdom and TYMNET internationally. All terminals are in communication with the central system concurrently, though they are unlikely all to be transmitting data simultaneously. Response time on the network averages 5–7 seconds during the peak period of the day

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(14.00 to 20.00 UK time). The system is available 17 hours per day Monday to Friday and 12 hours per day on Saturday.

The hardware at the centre of the network is made up of a variety of equipment which supports the different operating functions. Terminals, which are connected to the international multidrop, leased-line network, are connected to a number of Communication Processors both local and remote which poll user terminals and transmit messages to the Network Supervisor. The Network Supervisor routes incoming requests evenly among the Host Processors which handle most of the message processing. The host processors access the database via the Database Processor. The Database Processor consists of a number of computers which work in unison to provide access to the online union catalogue database which currently consists of 86 disk packs, half primary half mirror—each disk has a duplicate at all times, providing security and constant back-up. Both copies of the database are updated simultaneously.

As the host processors request records, the database processor finds the appropriate records. If more than one record is found in response to a search, the database processor organises these records before returning the information to the host processors. This process frees the host processors to handle other activities and improves average response time.

Total systems burden is best described in terms of total message traffic from the users. During a typical day users input 1.98 million messages from terminals and the system generates a corresponding number of outbound messages in response. Input message size averages 27 characters, while output message size averages 450 characters. About 60 per cent of all input messages require database access.

Access to the bibliographic database is provided for by a variety of search keys. All records are available online to all users during the 17 hour operational day. Users do not merely have access to records, they are able to interact with the database, modifying records and creating new records. New records are added at a rate of 5,000 per working day, 3,500 of which are created by participating libraries. This represents a database growth of about one million MARC records per year. All new records are indexed 'on the fly' so that they become immediately available online to all other users of the system.

An OCLC search key is a formatted group of characters entered by a user to identify a record for retrieval from the online union catalogue (database). A search key is derived from information about the work such as its title, author, Library of Congress card number or International Standard Book Number. A user constructed key is compared online with a given index file—a collection of keys that have a common format and are derived from a common class of data elements. The following index files are available in the OCLC system:

Library of Congress Card Number (LCCN)
International Standard Book Number (ISBN)
International Standard Serial Number (ISSN)

CODEN
OCLC Control Number
Title
Name/Title
Personal Name
Corporate Name
Government Document Number

All search keys may be qualified by kind of material:

Books
Manuscripts
Maps
Media
Music Scores
Serials
Sound Recordings

and by year of publication.

The system indexes bibliographic records as the records are added to the Online Union Catalogue. Thus, as soon as a new record enters the Online Union Catalogue, the record may be retrieved by appropriate search keys.

3. The OCLC shared and distributed services

OCLC offers a comprehensive range of shared services to the library community. It will be helpful to describe each one in summary.

3.1. *Cataloguing subsystem*

Benefits:

* Online access to a union catalogue of 3,000 libraries
* Quick, efficient cost-effective cataloguing
* Online access to LC Name-Authority File
* Elimination of duplicate cataloguing effort
* Increased bibliographic control
* Wide variety of output

This subsystem allows libraries to catalogue online and to produce a wide range of catalogue output. Whenever possible existing records are utilised and may be modified to conform to local practices. If an item is found a new catalogue record is entered into the database. New records are available to other OCLC users as soon as they are entered. Cataloguing rules conform to AACR2 and the record format is MARC. The Library of Congress Name-Authority File which is available online, provides currently acceptable forms of name and associated references.

Individual library requirements are analysed and profiled. A wide variety of catalogue outputs are available and include name, title, subject and classified sequences reproduced at required frequencies. Catalogue output may be produced on card, slip and other printed stationery or in microform.

Magnetic tape listings can also be produced to support local computer applications. Accessions lists can be supplied as camera-ready copy or duplicating masters and subject index provision is being investigated. Print technology applied includes the use of laser printers with the full ALA character set.

3.2. *Acquisitions subsystem*

Benefits:

* Order and in-process items available in a single file
* Online access to up-to-date fund information
* Reduced staff time for typing, processing and posting orders
* Immediate access to status of any item
* Reduced receipt of unintentional duplicates
* Online access to names and addresses of OCLC members and library suppliers

This subsystem provides fast, cost-effective control of library acquisitions. It enables libraries to create online records for orders, receipts, claims, cancellations, renewals, inquiries, financial transactions and funds control. OCLC will print and post orders, requests and inquiries directly to suppliers. Using this subsystem users may generate fund reports that provide administrative, planning and management information. The Name-Address Directory is an online file of name and address information about libraries, publishers and suppliers. It acts as a ready-reference guide and provides automatic addressing for orders.

3.3. *Serials control subsystem*

Benefits:

* Reduced processing time
* Online access to detailed, up-to-date information about a library's serials holdings
* Access to Union List data, containing summary holdings information for Union List participants
* Access to bibliographic and holdings information in a single online file
* Comprehensive bibliographic and inventory control for serials

This Subsystem includes serials check-in, claiming and union listing. Used in conjunction with the Acquisitions and Cataloguing Subsystems, it provides almost complete control of serials. There is access to 500,000 serials bibliographic records, of which a growing proportion have been authenticated by the Library of Congress and the National Library of Canada as part of the CONSER Project. Check-in of serial issues can be automatic as can the identification of missing issues. A customised claiming facility is available. The Union Listing facility provides a cost-effective means for creating, maintaining and distributing serials union information, both online and in listed form.

3.4. *Interlibrary loan subsystem*
Benefits:

- * Rapid communication of loan requests
- * Access to Online Union Catalogue of 3,000 libraries
- * Online creation, retrieval and maintenance of loan requests
- * Increased availability of library resources
- * Access to over 127 million holdings

This subsystem enables libraries to create, transmit and fulfil loan requests more rapidly and efficiently through online communications. Linked to each record on the Online Union Catalogue are location symbols identifying libraries that have used the record for cataloguing. The borrower can identify up to 5 potential lending libraries, the system transmits the loan request to each potential lender in turn. Each library has a message file containing notices of new requests, responses to requests, overdue notices and special messages.

In addition to the shared services, OCLC also offers a distributed (stand-alone) system, Local Library System.

Benefits:

- * Circulation plus
- * A comprehensive range of housekeeping services
- * Stand alone configuration
- * Linked to the OCLC shared online network
- * Modular in design
- * Libraries may cluster

The development of this subsystem is nearing completion, it will form the first part of a stand-alone system providing a comprehensive range of online library housekeeping activities, which include circulation control, catalogue processing, acquisitions and ordering, and public catalogue access by a comprehensive range of search keys including subject. The system is also linked online to the OCLC shared network. The Circulation Control Subsystem will provide libraries with automated loans, returns, renewals, reservations and report generation. Libraries will be able to produce recall notices and cancellations, overdue slips and fine notices. A variety of offline listings will also be available.

4. Offline public catalogues

While OCLC is able to offer a complete range of offline catalogue products, card, slip, printed page, magnetic medium and microform, my intention in this paper is to describe the microform system developed by OCLC Europe for the United Kingdom library community. This system may soon be adopted universally as an addition to the direct product range offered by OCLC in North America.

The system adopted by OCLC Europe is a customised version of a UK based software system called LIBPAC. The elements of the software of particular interest to OCLC Europe were the MARC file maintenance system and the catalogue output system. Customisation addressed the need to produce a wide variety of catalogue sequences to satisfy both UK and US library requirements; the building-in of various filing routines to handle complex bibliographic record structures, and the minimising of paper input.

Let me describe the system. Each OCLC Europe member library has the data it has accessed and processed online written on to a multi-institution MARC exchange tape by OCLC in Dublin, Ohio: this data tape is transmitted to OCLC Europe's computer bureau in the United Kingdom. There the data is converted from OCLC exchange format to LIBPAC's internal format. The records are sorted and validated. The member library's offline database is then updated. New records to the database or amendments are formatted into catalogue entries and sort keys are generated in parallel. The formatted records are sorted into sort key sequence within catalogue type. The master formatted files are then updated. Those formatted files are then page structured for microform production.

The system has been designed to allow OCLC member libraries, making use of the microform service to operate in an online mode, whilst the microform software operates in a batch mode.

The microform system has been designed to give total flexibility of output for MARC records so that they can be formatted and sorted into catalogue sequences and layouts desired by the library.

Libraries specify the type(s) of catalogue required from the records processed by them through OCLC's cataloguing subsystem. Within each catalogue the layout and type of entries required is discussed with Europe staff who translate such instructions into a 'profile' for the individual library. A library may require a number of profiles in order to maintain a complete set of catalogues. Profiles create different entry types and allow the user to format entries to be included in up to nine catalogue sequences. All sequences are processed at a single pass of the file.

The profiling logic allows the user to specify elements of data to be included in the entry, the order and layout of entries and to format the data into columns and pages for output to microform.

It is also possible to provide additional profiles for libraries wishing to produce special listings at particular times. Libraries may, for example, wish to produce annual catalogues of particular types of material or to produce a catalogue to special or local collections. Special listings can be produced on COM or, if preferred, phototypeset.

The current microform facility provides libraries with catalogues that can include material described by the various OCLC MARC formats.

OCLC Europe has designed a system for the input of references to local library COM catalogues. References are individual library catalogue specific and it is the responsibility of each library to ensure that it enters the references it requires. A major source for name and title references will be the LC Name Authority File, available online through the OCLC system. Data creation and input are batch, i.e. libraries transcribe required references on special multipart forms supplied by OCLC Europe. Forms are sent for data preparation and entry to local catalogue files.

5. Summary and Conclusions

It is worth summarising what OCLC Europe is able to offer the library community; the service applies to libraries both large and small, there is no discrimination. OCLC Europe offers the most comprehensive range of shared services available in the United Kingdom: shared cataloguing, acquisitions and ordering, serials control, interlibrary loan, all online in real time. At the centre of these services is an online union database of over 9 million MARC records, an online Name-Authority file of over 750,000 entries and an online Name and Address file. Access to these databases and systems is via a dedicated national/international telecommunictions network with nodes in Birmingham, Bristol, London, Colchester, Manchester, Newcastle and Edinburgh. OCLC offers a United Kingdom Library Database System now in association with a powerful and comprehensive range of shared library housekeeping services.

OCLC Europe does not merely offer shared services, it also offers an integrated distributed (stand alone) system package Local Library System. The system currently includes circulation control, catalogue processing, public catalogue access and an online link to the OCLC shared databases and services. Local Library System will soon be enhanced to include Aquisitions, Serials Control and online gateway access to Reference Services such as interlending and information vendors. OCLC's sound financial base and satisfied membership of over 3000 institutions is a consequence of the development and maintenance of a comprehensive range of systems and services which the library community want and can confidently rely on. OCLC's response to user needs is an imperative of its management structure, a not for profit corporation directed by its members. It is this structure which will secure OCLC's future by ensuring that it is always to the forefront in leading the library community to the new frontiers of technology.

A Future for Printed Indexes?

Jennifer E. Rowley
City of Birmingham Polytechnic

The present applications of printed indexes in books, periodicals, quick reference sources and indexing and abstracting publications are considered, and the future for printed indexes in each of these spheres is examined. The printed index is often a supplement to the document which it indexes. For each of the four categories of printed index two questions are explored: whether the documents being indexed will continue in printed form; and whether it will continue to be unacceptable to have the index and document in different physical forms.

Introduction

AN INDEX HAS BEEN variously defined to be 'an indicator', 'a pointer', or more specifically, 'an alphabetical list, usually at the end of a book, of names, subjects etc.'. A printed index will be defined for the purposes of this article to be an index produced on paper or film, where the text of the index, once printed (by whatever process) is set and can only be effectively altered by issuing a supplement or new edition. Also, the headings under which items are organised or which a user can consult are fixed for the life of that issue of the printed index. Thus in the category of the printed index we include conventional paper indexes, computer printed paper indexes, COM indexes, and various other microform indexes.

Printed indexes have been common in libraries for many years. Wherever a reasonable number of documents or items of information might need to be accessed or organised an index will often be created to aid in this process. At first most of these indexes were on cards, slips or paper in book form, with their text in typescript, manuscript or printed. The production of indexes has been one of the areas where the introduction of computers has had the most direct impact. In the 1960's early computerised information retrieval systems generated printed indexes and offered batch search facilities. Now, online information retrieval systems are well established as a means of sifting and organising information and document references.

Online information retrieval has much to offer, yet printed indexes still abound in any document collection. What have these indexes to offer that is not available through online information retrieval? Maybe it is the coverage of printed indexes, and their ability to be tailored to the document or collection of documents being indexes that will ensure their continuation. But, what of the impact of microcomputers in this role, and the greatly simplified possibility

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of establishing local indexes on microcomputer? This paper addresses itself to some of these questions.

Current applications of printed indexes

Before attempting to speculate as to the future of printed indexes it may be as well to list the general areas in which printed indexes feature today. These could be enumerated as:

(1) Book indexes, including indexes to textbooks, conference proceedings, reports etc.
(2) Periodical indexes (to individual periodical titles), including both volume indexes and cumulative indexes.
(3) Indexes in directories and other quick reference sources.
(4) Indexing services and indexes to abstracting services, most of which attempt to cover a specific kind of document (e.g. dissertations) or a subject area (e.g. technology).

Maybe the existence of printed indexes seems obvious in some of these categories, but certainly in the fourth category there is a direct conflict between the printed index and online information retrieval. The contents of many abstracting publications, can, for example, be accessed either via a printed index or online. Online indexes offer more flexible search strategy, and easier searching. To compound this advantage, online information retrieval offers easy recording of references, with a variety of options on output. Why has the printed index persisted thus far? A number of factors can be identified, but will these same factors continue to hold true or continue to have any significance?

Plainly, a significant consideration is that indexes are supplements to other documents, usually the document which they index. Many types of index are more conventient if they are in the same physical format as the documents which they index. For instance, an online index which indexed the contents of a printed on paper book, would be less likely to be consulted than a few pages bound as part of the book. Equally, an index to a periodical is most appropriately bound in the same form as the original periodical, whether that periodical be paper, microform, or electronic. In this respect the continuation of a printed index depends upon its parent document continuing in printed form, e.g. the continued existence of printed books and periodicals. Also, the future of the printed index hangs on the continuing inconvenience and limited cost effectiveness of opting for different media for text and index. The future for the printed index will be determined by the two factors identified above, but the influence of those factors is likely to be different for different categories of index. For this reason, each category of index will be considered in turn.

Book Indexes

Books, such as literary texts, textbooks, manuals, guidelines, conference proceedings, reports etc, in themselves are likely to persist and this augurs well for the indexes that accompany them. The actual process of reading and digesting and comparing extracts of text for long periods is still most comfortably performed with a book or series of books. It is not the purpose of this article to develop this theme further, but extended periods of time staring at a VDU screen are still regarded as undesirable by most people. Of course, in the next decade VDU screens will improve beyond recognition, but it will be a long time before they achieve the user friendliness and convenience of reading a printed book.

The second point, as to whether it will continue to be inconvenient to have book indexes in a different format from the original book, confirms the view that the printed book index is safe. Whether it will continue to be inconvenient to study indexes in microfiche, or at a terminal associated with a microcomputer, depends on the design and accessibility of such equipment. If such equipment were to be sufficiently cheap so that it could be present in almost any reasonable location in which a person might be studying a document, there might be grounds for experimenting with this alternative form of index. With such aids more effective access to segments of the text of a book might be achieved, and there would be no need for a printer to be associated with the 'reader' installation. However, I suspect that a determining factor which will dictate that printed book indexes continue will be economics. It is likely to continue to be relatively cheap to simply add a few more pages and bind this in with the text of the book.

Periodical Indexes

The situation for printed indexes to periodicals is somewhat less secure. First, there has been considerable discussion and experimentation with alternative journal formats. For a long time the economics of journal publishing have been finely balanced. Experimental formats started with the synopsis journal, a combination of full text on microform, with summaries of articles printed on paper. Now, with the development of the BLEND Project, the acceptability of the electronic journal is being assessed. Neither of these forms have yet proved themselves as popular alternatives to the printed journal, yet the economics of journal publishing have only to become just a shade more precarious, before an alternative form may be seized upon by the publishers and foisted upon a reluctant public as the only possible economic alternative. As an interesting aside, it might be worth pondering the preferred medium for intending authors of periodical articles in the future. Will it become a mark of extra-special achievement, or merely a sign of the economic significance of a contribution, if the author's work is published in paper form? Will the paper journal become the medium of the élite?

Journal indexes are also under fire on the second of our considerations. Indexes do not have to be issued as an integral part of the journal, and thus the economic pay-off of issuing the index and the journal in the same form is less clear than with books. Already, many journal indexes are published as a separate document to the parent journal. This separate activity incurs distinct costs, which can be examined closely as a self-contained component. Attempts to reduce these costs, especially for the production of large cumulative indexes may well lead to the consideration and implementation of other physical forms of index, other than the now common printed index. Further, an index on a floppy disc that can be inserted into a local microcomputer, offers no particularly insurmountable hurdles to the user, and may certainly be marketed as providing improved access to the contents of the periodical. Periodical indexes normally index a series of articles, often of considerable bulk. Such bulky volumes, particularly if several volumes must be consulted simultaneously are likely to be perused in a formal studying environment such as a library or an office. In such environments it seems likely that appropriate facilities for reading a machine stored index might be made available. This theme is developed further in the next section.

The number and variety of journal publishers will probably lead to a variety of formats for journal indexes, but it seems likely that the present monopoly of the printed paper index will not continue unchallenged for much longer.

Printed indexes in directories and other quick reference sources

Printed indexes in this context seem set to lose significance, largely because many of these sources are themselves likely to change to a machine readable format. It is likely that for some while various quick reference sources will continue to be produced in both printed and machine readable form in order to spread the costs of collation of the information across the largest possible market. However, in time, economics will probably dictate the demise of the printed form for a number of these sources. Already Viewdata systems and Teletext systems provide access to a small section of this type of information. The future of these systems depends very much on marketing and on catching the imagination of the public and the small businessman. Significant buyers of existing quick reference sources are libraries and other organisations requiring basic reference collections, such as advice agencies and small companies. Libraries buy on behalf of the general public and commercial and business users. Before a machine readable version can oust the printed directory these buyers have to be convinced of the greater cost effectiveness or just plain effectiveness of a machine readable version. Alternatively, libraries and organisational collections can be eliminated from the chain of communication by direct marketing of certain types of information to those who will use it.

As to the second issue, that is the possibility of indexes in a different form to the source itself, many of the comments that were made in respect of the indexes to periodicals also hold in this case. The difference for this type of index is that the index is often an integral part of a directory, and in these instances it might be difficult to divide the text into index and the rest. Consider a telephone directory, for example. Addresses are listed accompanying each access point (usually a name of a person or an organisation).

Indexing services and indexes to abstracting services

These services have already seen considerable shift towards computer stored indexes which are accessed via online terminals. Indeed, much of the experimentation to date with machine stored indexes has been associated with databases which have grown from a printed abstracting or indexing service. Yet printed versions of abstracting and indexing services and their indexes still represent a significant revenue earner. Despite the undoubted advantages of machine stored indexes, libraries and others continue to buy and use the printed version. The printed index has continued, and will continue as long as the abstracting journal and indexing journal is sold in paper or microform. Why does the printed version still find a market, when some databases have been available for machine searching for at least fifteen years? Are the days of the printed index in this context likely to be numbered, and, if so, when will the printed index fade into insignificance?

Where machine indexes have supplanted their printed equivalent they have accepted the necessity of separating the material into different physical forms for distinct stages in the search process. Already there is a mix of the printed and machine readable form. The search stage is achieved online, but the document delivery and consultation steps are conducted manually, by writing forms, consulting printed catalogues, and reading printed books and articles. This split between physical forms is acceptable for extensive searches involving searching through many documents, and with high recall and precision expected in the output. However, the split is not necessarily suitable for all types of search. The rapid identification of a few books or articles on a clearly defined and easily described subject can still be achieved most easily in a printed index.

Conclusions

The availability of machine readable indexes will have some impact on whether printed indexes cease to be important, but also, on the style and comprehensiveness of the future printed index.

Printed indexes would appear to have a future, but that future will be more restricted than their present. In particular, the printed index will be created in environments where the more intractable indexing problems associated with comprehensive, yet specific indexes will often be tackled by online access to computerised databases. Further, many of the printed indexes that remain will be generated by part-time indexers, such as book and periodical indexers. There is a danger that the theory associated with printed indexes will cease to be noted by practising indexers, and that any theoretical investigations in the area of printed indexes will remain just that. The printed index will continue, but this does not automatically imply that the art of indexing will be maintained.

SO YOU WANT TO BE A PRESTEL INFORMATION PROVIDER?

A manual of practical advice for providing local community information on Prestel

DAVID OLIVER
CATHERINE SULLIVAN
JOYCE BARR

The purpose of this manual is to give practical advice on creating an information file on Prestel. The authors' experience is based on some two and a half years' work with Prestel. A major part of their activities involved the operation of an 'umbrella' service, on an experimental basis, as part of research investigations supported by the British Library Research & Development Department. During this period, local community information supplied by six public library services in London, Birmingham and Norwich, was used to develop local files on Prestel amounting to some seven thousand frames, large by current Prestel standards. The information was entered at a central editing point in London (Aslib Research and Consultancy Division).

The advice given will be of particular relevance to organisations wishing to provide local information. However, certain ground rules apply irrespective of information content, and this manual should prove useful to other potential Information Providers (IPs). Those aiming to participate in a co-operative or 'umbrella' service on Prestel, whether a local authority, voluntary organization or private company, should find the information on the kind of arrangements required and problems involved especially useful.

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ASLIB PROCEEDINGS

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Quality control in online databases

Ralph Gee

Paper presented at an Aslib Informatics Group Meeting, 21 February 1983.

Introduction

WHEN THIS GROUP approached me for a paper I was then Database Systems Manager for the European Law Centre, publishers of the online legal library EUROLEX. Since then much coloured water has flowed beneath the bridge, so although I will be picturing the philosophies of that service, this paper should be interpreted as just one approach which could apply in any electronic publishing venture. It follows that any opinion is my own and does not reflect Eurolex now or in the future. None of us can deny the past, but for all I know certain substantial changes may be envisaged—although the philosophy *should be stable—and quality control should be synonymous with stability.*

Database production

There is a conceptual difference between publishing a database and publishing *by* database. Whatever the promises of IT year, full-text retrieval systems are still largely outside the category of primary publishing, being presently reprint services with added value. Services such as LEXIS and EUROLEX are constrained to some extent by the format and quality of original publication, where 'quality' means not the accuracy of reporting, but the levels of typographical and editorial styles of the conventional typeset publication.

Until electronic distribution of the primary source is both economic and professionally acceptable, online services will offer just other editions of the printed page, with obvious responsibilities. The data should be as close a surrogate as possible to the original format as copyright decrees and as convention allows, and to the continuing satisfaction of the subscriber.

Although the needs of the marketplace have shaped the production policies of online publishers, these needs were themselves generated by those very formats of legal publishing already dictated by earlier constraints of printing technology. The future, however, should see a less pre-conditioned perception of the flexibilities of textual and graphic data processing as the need to imitate ink on paper fades. In the meantime we strive with new and unfamiliar tools to re-invent the printing press and to cope with problems very familiar over 500 years of reprographic technology.

I see four areas where the quality of production in databases is affected by contiguous factors:

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(1) Typographical or informational state of source data;
(2) Methods of data preparation and the consequential state of the input production tape;
(3) Data editing management: meaning the operational specifications, applications programs, and number and quality of keyboard editors:
(4) Constraints of the particular end-user retrieval language, for example STATUS.

In its quasi-editorial processes, to retain data stability through consecutive changes from the Caxton caterpillar to the electronic nymph, online legal reporting uses those time-honoured partitions of legal reporting identifiable as headnote, facts, argument, judgment and ruling—while emphasising such features as lists of citations and counsel. These segmentations are more than added value to users—being datum points, or rubrics in an unguided datascape. Verifying these sections may appear to be subjective since they are more recognisable to the client than other essential objective controls.

The printed texts comprising source data input are converted from the paper pages onto magnetic tape; transferred to disc; the words concorded by data compression; and finally the data is logically but transparently organised to convince the user that he sees sequential information rationally presented.

There is an inherent relationship between database logistics and the printing process, and electronic publishers who are an extension of traditional publishing may in future transcribe terms from printing production to express analogies in database production.

We electronic publishers refer to an update, while a printer will refer edition. Our libraries are publishers' serials. Printers collate, while we sort and merge. Our datasets were in earlier times fascicles or stones. Printers have their imps, while we (less romantically) suffer from bugs. The problems are germane. How to represent the authors' intangibles by identifiable portions of technical process, and to create a product that is not a barrier between the originator and the reader, or between the enquirer and the solution. Or, in our case, which does not diverge from the original typographical concepts excluding (at present) the unmanageable aesthetics of specific fonts. The result of error, common to both technologies, is a misgrint.

Diagnostic problems

The diagnostic production problems in database reprint publishing are:

Loss of words through misspelling, corruption of spaces between words, or from the effects of hyphens and other conjunctive symbols essential in typography;

Loss of individual records (lines of text);

Loss of sections or corruption of delimiters;

Loss or misplacement of datasets.

The end user may also face confusion from duplicated loads, which if in profusion will unnecessarily consume disc space and access time.

It must also be apparent that as the collective database increases at a greater rate than hitherto, and encompasses material of less familiar structure, more and newer diagnostic problems will emerge.

Where a system operates through a concordance (an index to the location of every searchable word), the production manager needs to consider the economics of millions of words without significance. Some of these are normal but almost unusable, such as 'Regulation' in the EEC *Official Journal*, but others like 'eg' and 'ie' may be created by removing spaces or points from abbreviations. The approaches of our incunable period may produce substantial headaches a decade hence, and database maintenance and restructuring will become a major element in our work; and it is at this stage that we begin to leave behind the analogies of the printing press.

Production processes

Because I no longer represent EUROLEX, I would like you to imagine a direct competitor called LEGIBASE, which will form an example for a brief review of the typical production processes.

Publications familiar to most legal readers are read and physically marked to indicate sections which will be used eventually within STATUS to economise on the end-users' retrieved lists, and these marked copies (which with ELC serials are page or galley proofs) are sent to external bureaux to prepare magnetic tapes. Likely faults at the mark-up stage are the omission of field delimiters, false identifications of sections, and misleading instructions for keying. The bulk of input is prepared by retyping text and markers onto A4 sheets using IBM typewriters with OCR-B golfball heads. These sheets are then scanned by an optical reader to produce a tape, and the possible errors here beyond those of typing could be tendencies within the OCR reader to misread or corrupt individual characters, or to lose input through the adhesion

TABLE 1. *Production processes*

PRODUCTION PROCESSES

0. Receipt of Source
1. Marking Up
2. Input Preparation
3. Stacking
4. Receipt of Input
5. Rebuild of Input
6. Proof-Reading
7. Online Editing
8. Online Vetting
9. Completion and Transfer of Output Tape for Public System Disc.

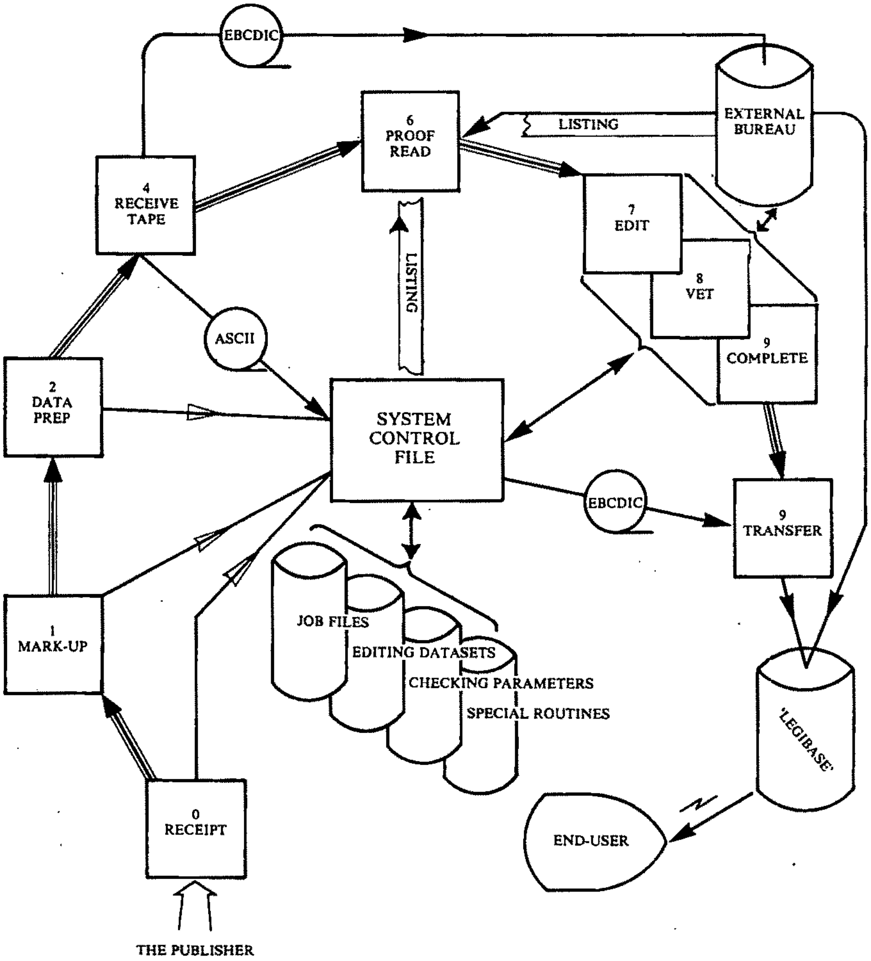

FIG. 1. *Database production flow chart (Processes 3 and 5 omitted)*

of pages. (Experiments in direct optical scanning of the original published pages have shown that the probability of some typical errors up to this stage may increase.)

Data preparation

The typical input-tape production methods used in conjunction with each other are transmission of manually annotated pages to:

(a) a bureau which breaks the work up for dispersed home workers to retype on IBM OCR 'B' typewriters for subsequent optical scanning;

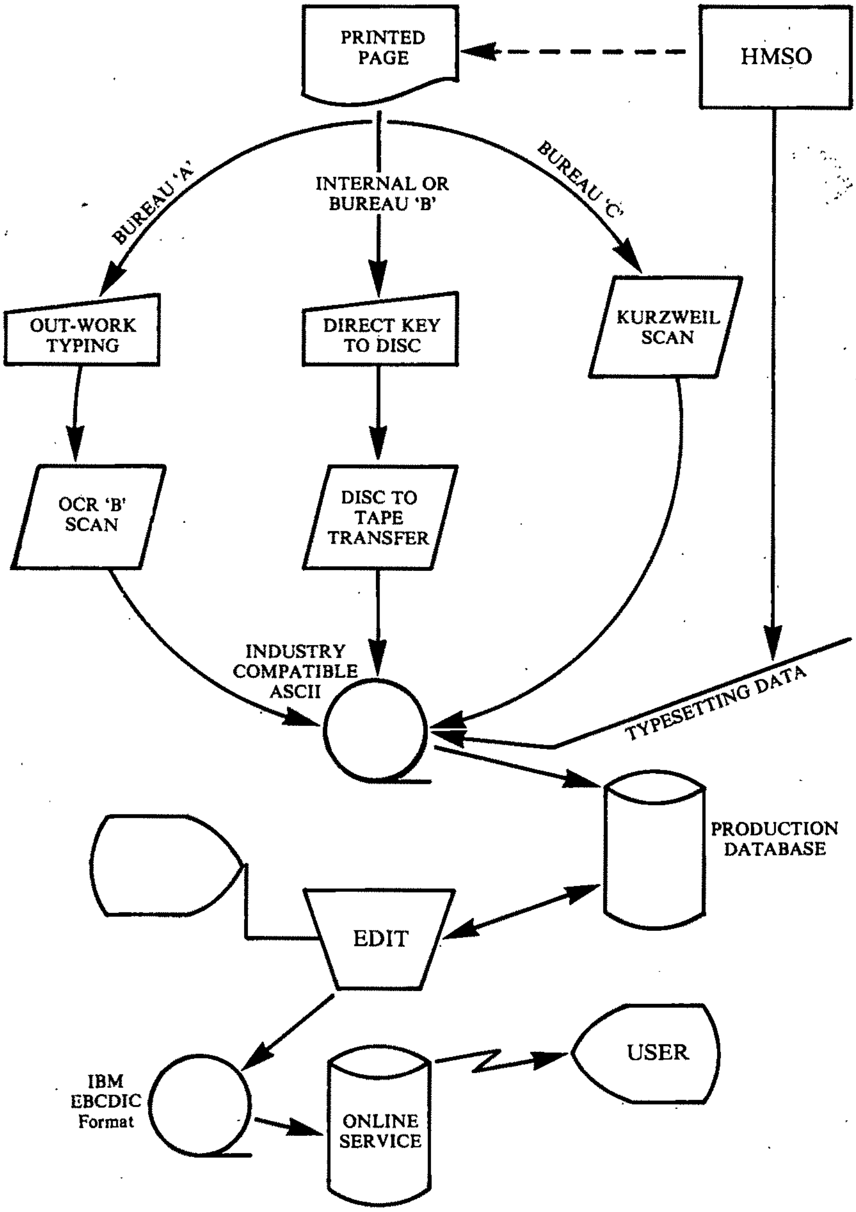

FIG. 2. *Data preparation*

(b) a bureau which keys directly to floppy disc with repeat for verification, subsequently converting to tape;
(c) an in-house transcription routine keying directly into computer files or word-processor discs;
(d) a scanning bureau capable of producing tapes by reading directly from the printed page via a Kurzweil machine.

These methods will be supplemented by the use of professionally produced publishers' tapes, such as HMSO; 'home-grown' experimental efforts from collaborative publishers; or other typesetting tapes of indeterminate specification.

Marking-up

Published documents are read by those with experience of legal sources who indicate, using simple alphabetical symbols, the beginnings and ends of: the title; sub-title; headnote; judgment; argument; facts; opinion; ruling; and uncategorised text. They also highlight the date of hearing; names of judges and counsel; and pick out citations of precedent cases, orders and statutes where the original publisher has not so done. Some publications, like statutes, demand detailed sectional analysis not shared by conventional law reports; while papers with authors require treatment more related to bibliographical description. All the marked fields become sections in the eventual STATUS format.

Proof reading

The tape is then loaded onto an online editing disc, either a spinner service offered by the computer service bureau, a separate bureau, or through the VAX 11/750, and from these a print-out of the tape is passed to proof-readers with legal background. Their task is to compare the listing with the marked original, noting omissions, corruptions and misspellings—and their results are passed onto the online editing team who call up the pertinent disc file to modify the text according to the observations of the proofreaders. The proofreader will use conventions similar to formal printers' marks, but since the listing paper is 130 characters wide for a 72 character output line there is adequate space for detailed comment and warning. Faults at this stage may be created or perpetuated by the lack of attention by the proofreaders, and without progress in automatic checking techniques, this is a vulnerable point.

Editing

The prepared tapes are loaded either into the in-house production datasets (VAX 11/750) or sent to an external online service which provides terminals which are used alongside internal DEC VT100s, although the VAX system provides an operational facility much more amenable to editorial quality control than the bureau service. The DEC System Control File suite, collaboratively developed with Software Sciences, allows operator involvement from loading to final transfer, including monitoring all stages. On logging in, the following menu is displayed:

```
                    Commands available
 1.  TAPE LOAD
 2.  TAPE ARCHIVE
 3.  TAPE TRANSFER
 4.  SYSTEM CONTROL FILE: ADD/AMEND/DELETE
 5.  SYSTEM CONTROL FILE: ENQUIRIES
 6.  SYSTEM CONTROL FILE: PRINT
 7.  EDIT FILE DELETE
 8.  EDIT FILE COPY
 E.  EDIT SESSION
 C.  CHECK AND EDIT SESSION
 L.  EDIT FILE LIST
 P.  SHOW PROCESS CODES
 R.  RE-NUMBER EDIT FILE
 S.  SPECIAL ROUTINES
 H.  SHOW COMMANDS
 9.  LOGOUT

 CHOICE: [input one of above]
```

Each of these options will have its own set of sub-options.

The commercial editing programs are applied to the disc files with all the required ADD, MOVE, DELETE, and global SUBSTITUTE facilities, and are supported by internally developed special programs. These cover input sorts; STATUS marker checks; STATUS constraint checks (paragraph lengths, mandatory and excluded fields etc); line renumbering; and the ability to produce a range of management reports. The reports cover activities by library group; production volume (in the bibliographic sense); processes; tape identity; job number; and the week in which any process was done to any job—and these can be printed by anyone at any time.

The editing stage is followed by the vetting process, which is basically the same except that the work is done by more senior staff who compare the disc file with the original publication, whereas the editing is done largely from the annotated proof listing.

Normally errors after vetting are those already inherent but which have been repeatedly unrecognised. The final computer check is of various specified parameters applicable to each library's profile, such as the existence of the required STATUS markers, coupled with indications that certain sections may be too long, or that line controls may be missing. There is as yet no attempt to check or correct spelling by automatic process, and although superficially attractive there are reasons why this may be counter-productive. For example where spellings are verified against a stored word-stock, which will take care of common words, neologisms, exceptional terms and personal names (i.e. those of searchable importance) will constantly be reported as errors.

There is an opportunity for a final check when all completed datasets are transferred from the editing disc to an interim store, from which the concordances are created or expanded, and this can be accessed online and modified by editing through keyboard. This is an expensive process and it is clearly preferable that no changes are necessary at this stage, but it happens from time to time. Once data is searchable corrections are only possible by pulling if off, re-editing and re-concording—or by carrying errata chapters. It is only right that the electronic surrogate is as permanent as the printed page.

Quality control

There is an undebated assumption in the database world that future quality control of individual words will be vastly enhanced by internal dictionaries or by dynamic reference by the system to its own concordance. I think the answer lies elsewhere. First, we must accept that the database is not a vehicle for improving the superficial qualities of the original (unless it exists primarily to produce the original), but for adding value while *maintaining* the primary standards. The quality of the source data should be accepted as the publisher pretends, and starting from this premise the answer must be to monitor continually the changes that are taking place within each process, a portion at a time so that differences can be reported back and accepted or modified. It may, incidentally, be necessary to ensure that the original published data are eventually transmitted with the original warts—so that the responsibility for negligence lies with the perpetrator. This will protect the database publisher from writs stimulated by bad text in the source data. I cannot accept that it is our task to present the *Times Law Reports* in a more correct form than the original publishers. Reprints are, after all, reprints.

There may be no need for complex data dictionaries for spelling control. Any slab of data in a full-text system will contain very few unique words, and even personal names may appear twice in any article. Indeed, it may be a worthwhile exercise to repeat them in special data-checking blocks. It is a straightforward thing to run a given file through a program which will report unique words in that file and highlight them in the context of the file. These can be readily checked, modified, or ignored. Despite the frustration of seeing common words misspelt, the essential effort should be devoted to those words which if misspelt are totally lost to the concordance and the end-user.

This relatively simple approach has one major fault: there are consistent errors caused by ignorance, habitual bad keying on the same combinations, or a consistent bug in OCR equipment.

It is clear that we spend much time and money attempting to correct not the original, but the transcribed tapes prepared for us by the external bureaux, and therefore the transcription of the printed page to tape is systemically wrong—particularly if the paper product is computer typeset in the first place, or (likely in the future) that the presswork is prepared on communicating word processors. There is a sequence of counter-demanding input/output processes which needs to be leapfrogged.

The electronic publishing production cycle is a chain of independent activities, each of which is reliant on the previous process. Any one phase can redeem the faults of before, but it can also introduce a fresh set of aberrations—thus suggesting x paces forward and (x-1) paces backward. In looking at controls to prevent the retrogressive steps, we find often that specific solutions create unanticipated problems elsewhere. In short, our total control process must be designed to ensure that all our complex manipulations have not resulted in destroying the original publication's intent.

Assuming the original data to be 99 per cent accurate, if we simply maintain those standards at every production stage we will be less than 95 per cent accurate at completion. Which is unacceptable.

When with the best resources and endeavours we have completed at 99 per cent accuracy this means that a database of 1 gigabyte (1,000,000,000 characters) has 10 million character errors! To improve towards perfection the costs will be an exponential progression. Any attempt to improve on 99 per cent is prohibitive and counter-productive. As human beings we must be aware that perfection cannot exist—and never has. I will stress that all recognisable errors are human, and the computer, not being divine, is unforgiving. Our task as electronic publishers is to get the computer on our side, and it is more amenable to anthropomorphism than the printing press.

I have presented reasons and excuses, but potential users of online services need to be assured of future solutions, without reaching for compensatory legislation. Accepting that there cannot be 100 per cent accuracy how far is it possible to be closer to 99 per cent than 95 per cent at a reasonable cost and to restrict those errors that appear to be of statistical necessity to semantic insignificance?

There is no easy answer to that question at a time when all database providers are squeezing themselves in providing quantity, while there are few qualitative standards.

Back-up levels by process

Quality control of production data in terms of the niceties discussed is meaningless without means of protecting work already done, or at least minimising the time for recovery.

Finally, it is essential that the spinner (the company actually presenting the service to the end-user) has good levels of back-up in its system management.

TABLE 2. *Control process*

Process	*Protection*
0. Receipt	Standard library periodicals control; File of local alternate source; Two copies—different names, same address
1. Mark-up	Vulnerable with casual out-workers; Second copy useful.
2,4. Data prep	Second copy covers loss on way to bureau; Bureau must keep copy of prepared tape; Retain sets of scanner input sheets
3. Stack	Copy of tape in substitute stack
6. Proofing	Vulnerable—cannot protect annotated listings; Keep allocated portions small so that loss or damage presents minimal recovery
7,8. Editing, vetting	Regular file dumps: weekly with daily incrementals; Editing sessions restricted to 1-hour between SAVES; Good RECOVERY facilities in editing package
9. Completion and transfer	Retain disc file until the completed data set is publicly searchable
Archive	Recover transfer tape from the spinner and store off-site, preferably in compacted form

Future developments

There are several developments which cumulatively promise higher reliability as well as speeding the rate of production, resulting in better and bigger libraries:

Access to composition tapes, and the future likelihood of typographical tapes created from database rather than the converse;
Creation once only and successive retransmission through improved telecommunications systems, with data enhancement similar to the image recovery processes developed in space exploration;
Continual automatic monitoring of data through each change of state;
Spelling check programs which enable the production dataset to compare against itself, irrespective of language or subject content;
Availability of high-capacity and high resolution optical technology.

A final point. Holborn is the home of English Law, the British Library LEXIS, EUROLEX. It is also the traditional centre of printing, with one of its famous pubs called 'The Printer's Devil'. It is a personally sobering thought that an early name for this imp of mischief was a ralph. I hope the imps with a tradition going back to Caxton see me as a traitor.

AUTHOR'S NOTE

This paper is based on a shorter version published in *Computers and Law*, February 1983—the journal of The Society for Computers and Law, whose permission for its use is appreciated.

subject areas, with chemists relying heavily on published sources. With regard to the publications of the Institute, both the name (the word tin implies the metal) and the history (little research into the chemistry of tin was performed before 1963, whereas metallurgical and coatings research was performed from the start of the Institute in 1932) mean that the Institute is better known to metallurgists than chemists. The work done in coatings research requires the skills of both chemists and metallurgists, so it is not surprising that the results of both citation and distribution analyses for this group of publications falls between metallurgy and chemistry.

Conclusions

This study has demonstrated the different citation policies which occur in different fields of science. Results are probably affected by the coverage and American bias of *SCI* and cannot be used to interpret the suitability of I.T.R.I. publications for the industrial sector they are, in the main, intended to serve. Distribution and sales figures are a more reliable source of this information, and it would be interesting to see if a change of advertising policy would alter the well defined trends in sales figures.

What this brief survey did show was the dangers of trying to compare citation rates of papers of different subject content and intended for different audiences.

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Three specialised data centres

John Martyn
Aslib Research and Consultancy

Introduction

THIS REPORT DESCRIBES THE Crystallographic Data Centre, the Engineering Sciences Data Unit and the Mass Spectrometry Data Centre, under headings covering scope and general description, input acquisition and processing, outputs, distribution mechanisms, staff training and recruitment, user aspects, cost-benefit considerations and future developments. It is based on information collected from published literature, extended interviews conducted at each centre, materials made available by the centres and a limited amount of telephone contact with users. The study was carried out between 17–28 January 1983, on behalf of the Office of Arts and Libraries, to provide input for the Library and Information Services Council Working Party on Centres of Information Excellence. Each of the three centres studied produces high-quality specialised data, organised and validated to suit the requirements of specialist groups. All have been in existence for at least fifteen years, and all have enjoyed Government support at some time. Two are now profit-seeking and one is non-profit; one is university-based, one is a private company and one is part of the Royal Society of Chemistry.

The problems of data collection, validation and use are very strongly conditioned by the nature of the field to which the data relate, and it is not possible to produce a generalised description of a Data Centre activity. However, it is worth noting that in the three cases studied, the initial contact with the collected data, either in the shape of an indication of its existence or by its actual publication, is made via the published literature, references to which are collected by manual and online search and by routine scanning, and in no case is payment made for the acquisition of raw data. In these cases, therefore, access to published literature, and the co-operation of the scientific community in providing data (and in assisting in its validation) are of fundamental importance.

The involvement of the conventional library and information community in the activities of these centres, apart from the provision of library resources at the beginning of the data-collection activity, is slight. Although the staffs concerned could fairly be described as 'information scientists', none have had library or information science training, and it does not appear likely that the involvement of anyone with information science training would materially have assisted in the development and operations of the data centres studied. This may not be true of all data-oriented activities, but it is clear that insofar as the generation, organisation and manipulation of data are an integral part of the process of 'doing science', to a much greater extent than the collection

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and organisation of the literature, data organisation and dissemination naturally demand the involvement of the scientist rather than of the information worker. It also appears probable that the use of data files of the type described here, particularly of those which include manipulative software, is the province of the subject specialist, and search of databanks is unlikely to be delegated to an intermediary in the same way that online search of a bibliographic base can be delegated.

The costs of data activities, as exemplified by those studied here, are hard to particularise, because of the existence of hidden subsidies, in the shape of non-commercially priced computer time, non-commercial rents and donated effort by scientists. It seems probable that 'costs per unit record', in the sense of cost per compound notified or its equivalent, are higher than is usual with bibliographic services, because of the extensive nature of the data presented, and the high labour costs of validation. It is also probable that data services, because of their high degree of specialisation, may have smaller markets than bibliographic databases, so that cost-recovery might be harder or initial investment higher than for bibliographic services. On the other hand, a good data service may find it easier to achieve market penetration, and if it serves a real need, is likely to enjoy more certain returns from the market. A good data service, of the kind described here, develops because of the pressure of user need, rather than because of interpreneurial action, so that market demand is built in from the outset to some extent. It would be unwise to develop a national policy for the creation of databanks in areas where there appear to be gaps in provision, but the provision of pump-priming facilities for databank development in cases of demonstrated need could be very rewarding.

1. Crystallographic Data Centre
University Chemical Laboratory,
Lensfield Road, Cambridge CB2 1EW
Tel: 0223 66499

Director: Dr Olga Kennard

Scope: Bibliographic, chemical and numeric crystallographic data for all organics, organometallics and metal complexes studied since 1935.

General description: A number of printed compilations of crystallographic data were in existence prior to the organisation of the Crystallographic Data Centre, but by the mid-sixties it was generally accepted that in order to handle the increasingly large amounts of data which were becoming available, a machine system was required. Following initial talks with the Department of Scientific and Industrial Research, the Crystallographic Data Centre was established in 1965, with full grant support from the Office for Scientific and Technical Information (which had taken over a part of the information responsibilities of DSIR). In 1974, when OSTI was transformed into the

British Library Research and Development Department, the responsibility for data activities passed to the Science Research Council; grant support of the Crystallographic Data Centre was administered by the Data Committee. With the demise of that Committee, Science and Engineering Research Council support is now administered by the Chemistry Committee, and a rolling grant currently amounting to £50,000 annually is provided, subject to the biennial recommendations of an Advisory Group. Other income is derived from contributions from national affiliated data centres in other countries (see below). The total direct cost of the Centre is of the order of £120,000 annually.

The Centre is staffed by 8 fulltime crystallographers, 4 halftime chemists, 1 fulltime clerical worker and 4 halftime clerical and other workers (the equivalent in total of 13 staff). The Centre is housed and served by Cambridge University, which also administers its finance; computer support (use of IBM 3081) is provided free of charge to the Centre, via remote job entry station. No problems of use of computer time are encountered, but some control needs to be exercised over use of disk space.

Input acquisition and processing

Initial input material is identified by journal scan, using local library resources to supplement the dozen or so journals acquired by the Centre, and searches of *Chemical Abstracts, Bulletin Signalētique* and other bibliographic sources. A bibliographic reference with added indexing terms is generated to be entered into the Bibliographic file which is a part of the Centre's output. Connectivity data is derived by a chemist, to form input for the Chemical Connectivity file. (Indexing and connectivity is based on a copy of the original paper, which is obtained locally or from British Library Lending Division).

Numerical structural data is taken from the published material, or may be acquired directly from a journal editorial office, from deposited printout or as hard copy from microfiche; in recent years the Centre has begun to act as a depository for unpublished data from a number of journals. There data are subjected to deep checking and recalculation, including the calculation of derived data. Checking is necessary to order to resolve typographic errors (approximately 25 per cent of publications have one or more serious typographic errors in the basic numeric data), and to validate and sometimes improve the presented data. Entries are handled in batches of 600, and unresolvable errors discovered in validation are referred to the original authors, each batch generating between ten and twenty such referrals. Response from authors is usually very rapid. Critical evaluation and error-correction techniques, together with referral to authors, has reduced residual errors to 2 per cent in the numerical database. Regardless of errors, entries are archived, with flags and comments, and cross-referenced to other determinations of the same substance.

Originally, two files, the bibliographic file and the numerical data file were maintained, the connectivity file being added after five years. The three-file base is now redesigned as a unified file, so that all three groups of information may be retrieved in one search instead of, as previously, by sequential search of three files. Until near the end of 1981, topological records in the Connectivity file were input by alphanumeric coding of the chemical graphs, but a recent internal software development now allows input of conventional chemical diagrams using a Tektronix microcomputer with a graphics tablet; the diagram is constructed by simple cursor movement, in association with a menu of elements. The molecular formula is typed in, and the software then allows computer calculation and comparison, chemical and graphical editing, and normalisation of the diagram using graph analysis procedures, to improve homogeneity and aesthetic quality of presentation.

Outputs

The database comprises a bibliographic file (BIB), a chemical connectivity file (CONN) and a numerical structural data file (DATA), for organics, organometallics and metal complexes studied by X-ray and neutron diffraction. The files cover the literature comprehensively from 1935, and had in January 1983 approximately 42,000 entries, representing data on 37,000 compounds; the 65 megabytes of the files are divided roughly into 10 megabytes of bibliographic data, 10 megabytes of connectivity data, and 45 megabytes of numerical data. Growth is stable at about 4,000 entries annually.

The Bibliographic file contains the compound name; synonym or trivial name; qualifying phrase(s), indicating, for example, neutron study, low-temperature work, absolute configuration determined; molecular formula; author list; literature reference; cross-references to MSD; chemical class assignment(s). The Chemical Connectivity file contains a compact coded representation of the chemical structural diagram in terms of atom and bond properties for each residue in the crystal chemical unit. The structural data file contains unit-cell parameters; space group; symmetry; atomic coordinates of crystal chemical unit; published bond lengths; accuracy indicators; evaluation flags; textual comment relating to errors located, corrections applied and details of disorder.

Each year a classified bibliography is published by computerised typesetting of a spin-off subset of The BIB file. The bibliography also contains computer-generated author-formula; permuted formula and permuted chemical name indexes. To date, 13 volumes in this series *Molecular Structures and Dimensions* (MSD) have been published and, starting with Vol. 13, an index of chemical diagrams is now provided.

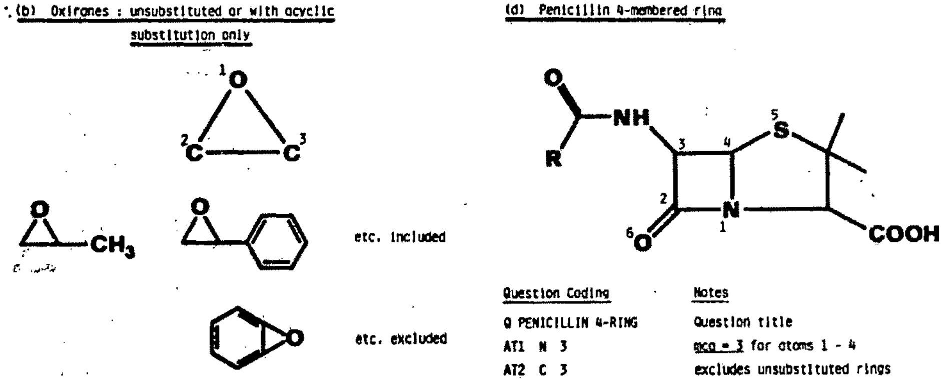
The three files are issued annually in January to Affiliated Centres (see below), with index tapes and update tapes issued four-monthly; the annual issue is on one tape, at 6250 b.p.i. compression. For a small number of users (particularly for the People's Republic of China) a hardcopy 'Current Awareness' service with updates every six weeks is issued. Some consideration has been given to serving a new market need by the production of subsets of the data on floppy discs, particularly to meet the needs of organic chemists requiring access to structural information.

Search, retrieval, analysis and display software is also made available to Affiliated Data Centres, in FORTRAN.

A more detailed description of the Crystallographic Data Centre output is given in an article in *Acta Crystallographica*,[1] from which the examples of a connectivity search and geometry calculations shown in Figures 1 and 2 are drawn.

Distribution mechanisms

There is no apparent large industrial or commercial market for crystallographic information (the major industrial use is in pharmaceutical industry), so that the major market was seen as being in the academic sector. This consideration influenced the means of dissemination of the collected data. The procedure has been to identify a Centre serving a country or group of countries on a geographic basis (such as, for example, a National Research Council), and to lease the database and updates to such centres for exploitation within their territories. In return each Centre contributes by subvention to the running expenses of the Crystallographic Data Centre, the contribution being proportionate to the number of crystallographers in their territories. All Affiliated Centres are supported by grant from their national governments. At present, Affiliated Centres exist in Australia, Belgium, Brazil, Canada,


(b) Oxiranes : unsubstituted or with acyclic substitution only
1 O
2 C
3 C
O
CH3
O
etc. included
O
etc. excluded
(d) Penicillin 4-membered ring
O
R
NH
3
4
5 S
2
N
1
6 O
COOH

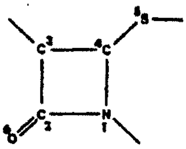
Question Coding	Notes
Q OXIRANES	Question title
AT1 O 2	
AT2 C 2	aca = 3 would demand a substituent at C2
AT3 C 2	
BO 1 2 1	1 = single bond
BO 2 3 1	
BO 3 1 1	
ALLBOND C	C = all specified bonds are cyclic
NOCS	No cyclic bonds may be directly attached to specified fragment
END	

Question Coding	Notes
Q PENICILLIN 4-RING	Question title
AT1 N 3	aca = 3 for atoms 1 - 4
AT2 C 3	excludes unsubstituted rings
AT3 C 3	
AT4 C 3	
AT5 S 2	
AT6 O 1 0 0 E	Exact connectivity match required
BO 1 2 1 C	Cyclic single bonds to define
BO 2 3 1 C	the four-membered ring and substituent
BO 3 4 1 C	sulphur atom.
BO 4 1 1 C	
BO 4 5 1 C	
BO 2 6 2 A	Acyclic double bond to keto oxygen
NOLN	No atoms in the coded fragment may
	be bonded together except as indicated.
END	

FIG. 1. *Examples of connectivity searches using* CONNSER.

Czechoslovakia, France, Hungary, India, Israel, Italy, Japan, the Netherlands, New Zealand, Scandinavia (based in Sweden), Saudi Arabia, South Africa, Switzerland, the United States of America and West Germany. A Centre has just been established in the Soviet Union. This method of distribution, with full exploitation rights assigned to the Affiliated Centres, effectively rules out commercial availability over a network such as EURONET, as this would conflict in individual states with the rights of national Centres. (Network availability is also not considered suitable for serious scientific use of this type of data, which requires continuous availability for a period of time, for consultation and manipulation).

The database is available in the United Kingdom from Regional Computer Centres in Cambridge, Manchester and London. Online access is also available on the University-SERC network from the Edinburgh Regional Computer Centre, as a result of a collaborative project between the SRC Daresbury Laboratory and the University of Manchester. It is believed that the online



Input Coding

```
C........QUESTIONS FOR GEOM78 FRAGMENT CALCULATION
C........DEFINITION OF FRAGMENT
FRAG 4-MEMBERED PENICILLIN RING
AT1 N 3
AT2 C 3
AT3 C 3
AT4 C 3
AT5 S 2
AT6 O 1 E
BO 1 2
BO 2 3
BO 3 4
BO 4 1
BO 4 5
BO 2 6
END
C........SETUP PLANE NO.1 THROUGH 1 2 3 4
SETUP P1 1 2 3 4 DEV 5 6
C........DEFINITIONS OF GEOMETRY AND TABLE HEADINGS
DEF D1 1 2
DEF D2 2 3
DEF D3 3 4
DEF D4 1 4
DEF C=O 2 6
DEF C-3 4 5
DEF A1 4 1 2
DEF A2 1 2 3
DEF A3 2 3 4
DEF A4 3 4 1
DEF T1 4 1 2 3
DEF T2 1 2 3 4
DEF T3 2 3 4 1
DEF T4 3 4 1 2
DEF DEV5 P1 5
DEF DEV6 P1 6
DEF *RFACT
```

Results

```
***TABLE FOR 17 PARAMETERS NOW FOLLOWS ***

                 D1       D2       D3       D4      C=O      C-S
AMCILL        1.382    1.528    1.528    1.466    1.181    1.812
BENPEN10      1.377    1.547    1.550    1.466    1.206    1.824
CMIPEN        1.391    1.557    1.556    1.476    1.184    1.764
IPENSX        1.388    1.528    1.555    1.480    1.192    1.839
METHIC        1.389    1.536    1.551    1.486    1.196    1.805
MPMAPC        1.417    1.569    1.573    1.448    1.167    1.799
PMEPEN        1.455    1.554    1.578    1.523    1.207    1.824
PXMPEN        1.414    1.528    1.562    1.465    1.182    1.790
TMPENI        1.408    1.524    1.542    1.434    1.151    1.839

MEAN          1.402    1.541    1.555    1.472    1.185    1.811
STD. DEVN.    0.024    0.016    0.015    0.025    0.018    0.024
MINIMUM       1.377    1.524    1.528    1.434    1.151    1.764
MAXIMUM       1.455    1.569    1.578    1.523    1.207    1.839

                 A1       A2       A3       A4       T1       T2
AMCILL        93.72    91.64    85.74    88.53     4.81    -4.61
BENPEN10      94.40    91.54    84.69    88.13     8.80    -8.32
CMIPEN        94.25    90.87    84.94    87.86    11.34   -10.76
IPENSX        92.50    92.21    84.50    87.71    13.83   -13.20
METHIC        92.25    91.79    84.40    87.61    15.57   -14.97
MPMAPC        95.21    90.17    84.68    88.89     8.10    -7.45
PMEPEN        88.19    96.02    82.85    92.35    -5.99     5.82
PXMPEN        93.42    91.91    85.42    88.66    -6.11     5.74
TMPENI        94.93    88.90    86.14    87.28    13.08   -12.12

MEAN         93.208   91.672   84.818   88.558    7.048   -6.652
STD. DEVN.    2.134    1.935    0.952    1.522    8.107    7.710
MINIMUM      88.190   88.900   82.850   87.280   -6.110  -14.970
MAXIMUM      95.210   96.020   86.140   92.350   15.570    5.820

                 T3       T4     DEV5     DEV6   *RFACT
AMCILL         4.35    -4.81    1.609    0.126    0.106
BENPEN10       7.82    -8.78    1.678    0.219    0.039
CMIPEN        10.14   -11.36    1.671    0.252    0.051
IPENSX        12.36   -13.59   -1.771   -0.273    0.047
METHIC        13.98   -15.43   -1.778   -0.362    0.029
MPMAPC         7.29    -8.08   -1.604   -0.199    0.062
PMEPEN        -5.54     5.87    1.588    0.147    0.130
PXMPEN        -5.54     5.98   -1.550   -0.150    0.054
TMPENI        11.92   -12.93    1.681    0.307    0.090

MEAN          6.309   -7.014    0.169    0.007
STD. DEVN.    7.327    7.999    1.752    0.253
MINIMUM      -5.540  -15.430   -1.778   -0.362
MAXIMUM      13.980    5.980    1.681    0.307
```

FIG. 2. *Example of geometry calculations (GEOM 78), with tabulation, for the search fragment of Fig. 5(d).*

facility is underused because of the administrative difficulties experienced by academic users in paying the telecommunications charges.

Online access is also afforded by the French PLURIDATA system, and by the US National Institutes of Health—Environmental Protection Agency's Chemical Information System.

A subset of the database, for training purposes and to facilitate system implementation (also containing pre-coded search queries and answers) is supplied to each Affiliated Centre, and there are a number of training manuals, some machine-readable. The production of a training film has been envisaged; one such film has been produced in the United States, and another in New Zealand, by academics using the database in undergraduate courses.

Staff training and recruitment

The senior staff of the Centre is stable, and turnover for other professional staff is satisfactory, with an average of five years in post. It has been noted that good post-doctoral staff of sufficiently high quality are becoming increasingly difficult to find. As far as possible, some recruitment of overseas workers is encouraged, in order to disseminate the acquired expertise more widely.

Training of staff is essentially informal, and 'on the job". Chemists need some training in crystallography, and most new staff need to acquire computer expertise, usually by attending the intensive courses available at the University.

In the past, when a new Affiliated Centre was established, staff from the Crystallographic Data Centre would visit the new Centre and spend a week or so helping it to begin operations. Nowadays, because of the availability of the training subset file, such visits are no longer necessary. One-day workshops are held at conferences, both for staff and potential users. User education and promotional activities are the responsibilities, in their own territories, of the Affiliated Centres; the Crystallographic Data Centre holds one-day workshops at Cambridge for university staff and research students.

User aspects

The core of the potential user community comprises the 5000 to 6000 crystallographers in the world. Other potential users are organic chemists in the pharmaceutical industry, to whom the data is of value in designing new drugs, and studying in vivo metabolism of drugs. Because a large part of the data concerns metal complexes with organic ligands, the database is becoming increasingly important to workers concerned with catalysis and effluent reduction.

This is to say that the potential user community cannot be counted accurately, but is with reasonable certainty of the order of at least 10,000. Because of the way in which the database is distributed through Affiliated Centres, no figures for usage can be obtained. However, one academic crystallographer reported use 'several times a day' and a pharmaceutical user reported weekly use, which suggests that those to whose work the data is central would be heavy users, and that the level of use by a committed user would be much heavier than equivalent use of a purely bibliographic base.

User feedback is implicit in the author consultations involved in clearing errors. More direct impact on the Centre is achieved by the relations with users through conferences and workshops, which often produce good ideas on content or search strategy.

Cost-benefit considerations

The American Crystallographic Association has estimated the cost of determining a crystal structure to be about $3,000, so that use of the database could, in theory, save an equivalent sum. This is not actually the case because, as the database content is derived largely from the published literature, in most cases a user could himself locate the relevant publication and thus acquire the needed data, although the data thus recovered would not have the same guarantee of quality as that carried in the database. The benefits accruing from use of the database therefore are qualitative, associated with the availability of checked and validated data presented in a uniform manner, and quantitative, associated with the time and costs saved by database use as opposed to literature search.

On the qualitative aspects, users described the database as a *sine qua non*, irreplaceable, and an essential part of the whole technology. Its non-availability would be a disaster, and some aspects, such as those relating to quality control and validation of data, could not be replaced by user effort. Some studies in protein crystallography would be impossible without its availability, and its lack would have serious effects on drug design.

On the quantitative aspects, users indicate that if the database did not exist, it would mean replacing ten minutes at the terminal with five or six days in the library. This would require at least half a man-year's additional effort, equivalent to an additional cost of £5000. As use in the UK is without charge, other than communication costs, it is not unreasonable to assume that the existence of the database saves core users something of the order of £5000 a year each, and that therefore the SERC contribution can be justified by ten core users in the UK, without considering the qualitative aspects.

Future developments

Mention has already been made of the possibility of producing subsets of the database on floppy discs, and of producing further training materials. Most planned developments involve the creation of new software, for use either in inhouse improvement of processing and validation or to provide additional tools for database use, such as, for example, the ability to enter a query with a structural diagram.

REFERENCE

1. ALLEN, F. H., BELLARD, S., BRICE, M.D., CARTWRIGHT, B. A., DOUBLEDAY, A., HIGGS, H., HUMMELINK, T., HUMMELINK-PETERS, B. G., KENNARD, O., MOTHERWELL, W. D. S., RODGERS, J. R., WATSON, D. G. The Cambridge Crystallographic Data Centre: computer-based search, retrieval, analysis and display of information. *Acta Crystallographia*, B35, 1979. pp. 2331–2339.

2. Engineering Sciences Data Unit
251–259 Regent Street,
London W1R 7AD.
Tel: 01-437 4894

Chairman: Dr A. J. Barrett

Scope: Evaluated design data for use in Aeronautical, Chemical, Mechanical and Structural Engineering.

General Description: From 1940 to 1963, ESDU was known as the Technical Department of the Royal Aeronautical Society, having originally been established to meet the need for data on design of stressed skin aircraft structures. During the war it was wholly funded by Government, and its products were restricted in availability. After the war, industrial demand ensured the continuance of the work, with support from Government and the Society of British Aircraft Constructors. In 1963 the Feilden report recommended that other institutions should follow the lead of the Royal Aeronautical Society, with the effect that in 1965 the Ministry of Technology gave a 3 year launching aid to the Institution of Mechanical Engineers, and shortly afterwards to the Institution of Chemical Engineers. The Technical Department of the Royal Aeronautical Society was expanded and became the Engineering Sciences Data Unit. In 1969 the launching aid ended, and following discussions between Government and a number of Institutions on the possibilities of a National Data Service, it became clear that if industry required such a service, it should meet the cost. ESDU was recommended to seek a commercial partner, and following the end of grant support ESDU become self-supporting, as a wholly-owned part of the Royal Aeronautical Society, from the sales of Data Items. The Institution of Structural Engineers started collaboration in 1970.

In 1971 the Thomson Organisation set up Engineering Data Sales Ltd solely to market the work of ESDU, and sales of over a million pounds were reported in 1980. ESDU's status at this time was that of a private company wholly owned by the Royal Aeronautical Society, with a separate Board appointed by the Society.

In June 1982, partly in response to financial pressures, ESDU was sold to the Thomson Organisation, and is now a commercially oriented private company which is a part of Thomson Data Ltd, a holding company which also owns the European Law Centre and Derwent. It is now known as ESDU International Ltd. It is managed by an executive Board; before privatisation the Board, which had Institutional and other members, was partly non-executive, and it is now proposed to set up an Advisory Council to develop the institutional links.

The turnover in 1982 was approximately £1.5 million, which included some small contracts for UK Government Departments or recognised international bodies (such as NATO). A 50 per cent Department of Industry grant has also been provided to help in production of interactive graphics packages (COMpacs) for mechanical engineering applications.

The organisation has 55 staff in the United Kingdom, of whom 30 are qualified engineers, scientists or mathematicians, and 25 are support (word-processing and clerical) staff and marketing personnel. There are also two representatives travelling in the United Kingdom, and three representatives in the United States, two covering the East Coast from an office in McLean Va., and one covering the West Coast. A professional information scientist maintains the library of technical records and internal documentation, and arranges acquisitions of material.

Internal computer support is provided by three Tektronix 4050 series desktop computers and a Hewlett-Packard 9845B (182k) with full graphics capability. An Osborne portable is available, replacing an Apple II. Occasional use is made of bureau services (SIA) using a Texas Silent terminal. Five AES Wordplex word-processing work stations are in use, of which three operate on shared logic and two are standalones.

Input acquisition and processing

When a Data Item topic (see below) has been identified, the raw material for input is derived by searching the published scientific and technological literature, with some supplementary material being acquired from time to time from collaborators serving on the Technical Committees. Online and other search techniques are used to acquire the input references, and the document backup is obtained from other Institutions and the British Library Lending Division. Once the raw data is obtained, it is carefully examined in terms of the experiments reported and the mathematical models used (often improving or developing new models), then comparing the results of model use with the results reported in the literature. This work is done by a qualified staff engineer, whose work is monitored, validated and enhanced by interaction with an appropriate Technical Committee. In each area of interest, a Technical Committee has been established, made up of leading academic and industrial experts; members of the Technical Committees meet staff up to ten times a year, and each Data Item is examined in detail by the Committees two or three times before its final form is agreed. The Committees guide staff work, suggest modifications and improvements, and consider the presentation in terms of its match with a known need. The consensus acceptance of a Data Item by the appropriate Technical Committee is necessary before publication is approved.

There are sixteen Technical Committees, covering Aerodynamics, Aerospace Structures, Aircraft Noise, Dynamics, Fatigue, Heat Transfer, Internal Flow, Mechanisms, Performance, Physical Data and Reaction Kinetics, Stress Analysis and Strength of Components, Transonic Aerodynamics, Tribology, Vibration and Structural Dynamics, Wind Engineering, and the Metallic Materials Data Handbook. Committee members are supported in their work for ESDU by their parent companies or institutions, which are usually heavy users of ESDU services. They are not otherwise paid, and attend meetings at their own expense; in compensation, they have access to draft data in advance of publication, and have an influence on the programme of work. Some foreign Committee members are Corresponding Members, others are normal attending members.

Topics for Data Item treatment are suggested by the Technical Committees, by monitoring of the literature, by user feedback and by market prompting.

Outputs

The principal product of ESDU is the series of Data Items. There are now more than 800 Data Items arranged in 18 sub-series, covering mechanical, structural, aeronautical and chemical engineering, as well as materials data. Some 55 new Data Items are added each year, and a number of revisions of old Data Items are produced.

The form of a Data Item can best be described by outlining the content of a reasonably typical item, No. 82018 'The pressure distribution at zero incidence over selected families of blunt axisymmetric forebodies', which is located in the Aerodynamics subseries, Volume 4. The Item work was carried out in the Aircraft Motion Group of ESDU. The Item contains a list of members of the Aerodynamics Committee who monitored and guided the work. Section 1 gives a listing of the notation and units used in the Item, SI units being used, and their British equivalents shown. Section 2 is an Introduction describing the contents of the Item. Section 3 lists and illustrates the families of forebody shapes and the ranges of parameters to be considered. Section 4 gives full explanations of the data which are presented in the Figures given subsequently, with notes on their derivations. Section 5 discusses the estimation of stagnation pressure at the body nose, Section 6 discusses estimation of local surface Mach number and temperature and Section 7 discusses the applicability and accuracy of the presented data. Section 8 lists the selected literature sources that assisted in the preparation of the Item, and some supplementary sources. Section 9 presents a worked example using the data. This is followed by a table of the source data for the figures, which in turn is followed by the data, presented in sixteen graphical figures occupying 34 pages. (Figure 3 gives an example of the graphical presentation). Appendix A presents the geometrical relationships for the forebody shapes considered, and Appendix B discusses the flow development over a blunt body. The back cover gives the purpose of the Item, its typical application and range of applicability, and lists other related Items.

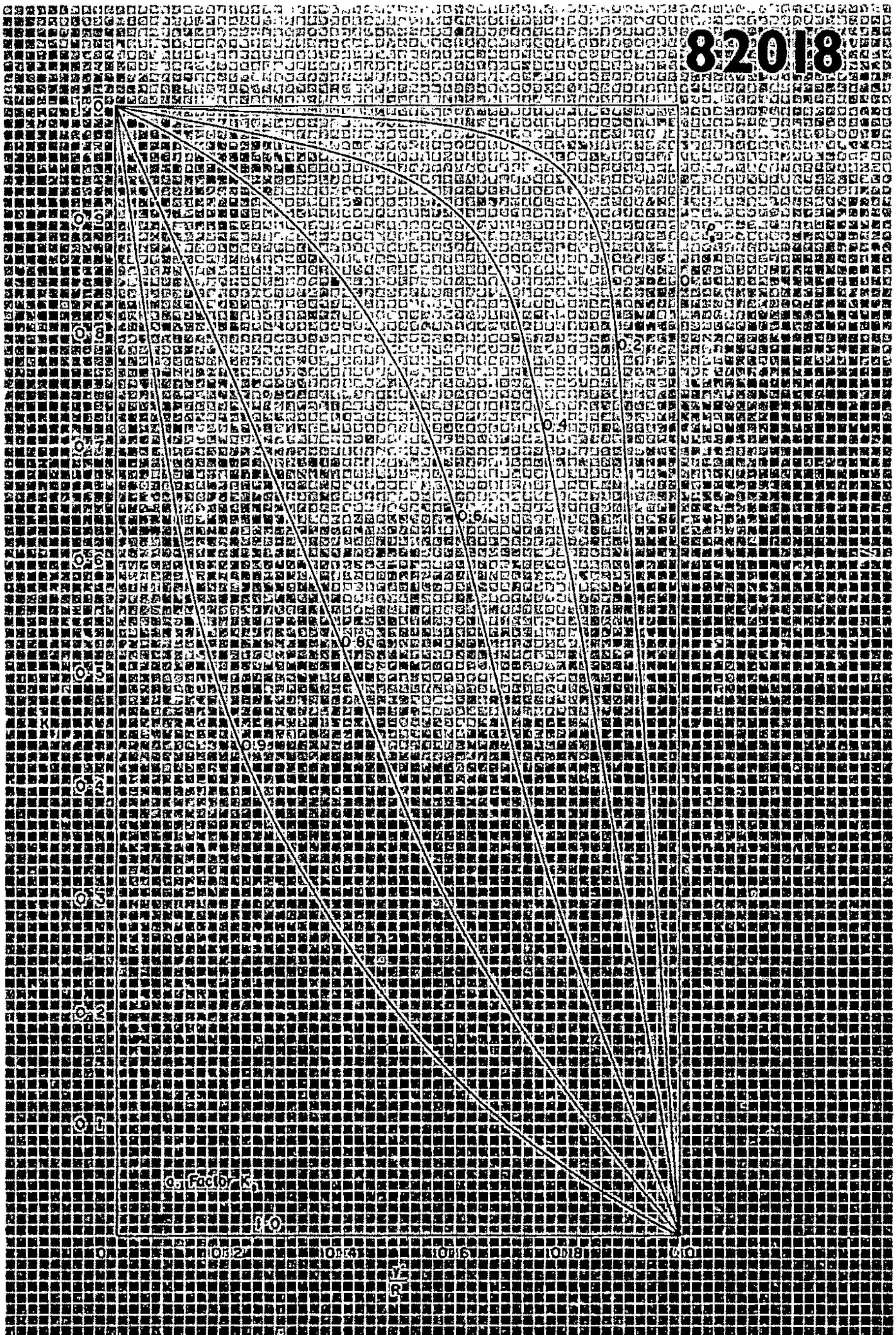


FIG. 3. *Example of the graphical presentation in a Data Item*

In addition to the Data Items, some of which contain listings of computer programs (usually subroutines) for manipulation of the data, ESDU also markets ESDUpacs, which are computer packages on 80-column cards, magnetic tape or paper tape, containing programs for engineering design and analysis, together with source data in the form of validated ESDU Data Items. They are available in a straightforward subset of FORTRAN IV, and some in a version of BASIC. Eighteen ESDUpacs were available in October 1982.

COMpacs are selfcontained interactive programs intended for engineers with small computers, which require no computing, programming or typing experience to run. They are based on one or more Data Items, and allow interactive calculation and storage of data from previous runs; they are designed to run on the Tektronix 4050 series, and exploit the graphics capability to provide automatic graphing, cross-plotting, 'zoom' facilities and scaled output, with a hard copy option where approriate. Translation to Hewlett-Packard compatible form is in hand, and soon all COMpacs will also run on HP 9845 machines. They are issued on tape cartridge and 8" floppy disk, and are fully supported by ESDU. Eleven were available in October 1982.

ESDU issues annually an index to the Data Items, which also contains a number of tables of data.

At present there is no intent to provide online access to the data produced, because of its unsuitability for such access, and because of considerations relating to the way engineers work and use information.

The average cost of production of a Data Item is approximately £12,000.

Distribution mechanisms

Most of the revenue comes from 'associates', who are customers with standing orders for one or more subseries. A new associate would purchase a foundation set of Items (all the items in a specific sub-series) and would receive new material and updates by standing order, invoiced on delivery. Very crudely, the cost of one Data Item is £60 approximately, but a range of discounts, to organisations supporting a Technical Committee member, to 'associates', to educational establishments and to others complicates clear statement of cost. New items are notified in engineering journals, and abstracted in NASA STAR, Engineering Index and other secondary services. Occasional advertisements are placed when considered appropriate, and presentations made at appropriate conferences. The marketing activity is being built up and intensified, with representatives visiting users and potential users, both to promote and to identify needs.

In addition to sales made to 'associates', there is a good volume of purchase of single Items, often by identification through the Index, which is marketed separately as well as being distributed to subscribers. The usual print run of an Item is 500 copies, and the average 'shelf life' is of the order of 7 years.

Staff training and recruitment

Staff turnover is relatively small, and good at qualified engineer level. In general, a new professional recruit would have good academic qualifications and some industrial experience, although recently some staff have been recruited directly from University.

It is usually about a year before a new professional member of staff is fully productive. In his first six months, a new member will work on a Data Item under the supervision of a Group Head, and will also take the ESDU staff course. This course is basically tutorial based on standard notes, and is mainly concerned with the philosophy of the work, the management of Technical Committees and how to relate to them, presentational matters, some evaluative techniques, and some advice on strategies for finding published information.

User education is not applicable to use of the ESDU products, but a Demonstrator program is issued for the COMpacs, and user manuals are provided for the two computer-oriented products.

User aspects

The target user group is that comprising the engineers who work in the areas covered by the Data Items, which includes aeronautical, mechanical, structural and chemical engineers (and others) engaged in design and testing. The potential user population is distributed worldwide, and roughly 73 per cent by value (50 per cent by volume) of the products are sold abroad. It is possible that English-language availability limits marketing in Europe, and no European representative is maintained, but citizens of some other EEC countries are members of Technical Committees.

User feedback is chiefly acquired through the Technical Committees, as described above, but some is also acquired in the course of promotional activities.

Cost-benefit considerations

A number of cases are known when the availability of data in one or more Data Items allowed the redesign of a component with an accompanying substantial saving, or where costly failures were averted, or causes of fatigue failure determined. However, open publication of case-history material of this kind, illustrating the often large savings that can be assigned to the exploitation of evaluated data, are in the nature of things extremely rare. A case is quoted of some designers of North Sea oil rigs who were underestimating the loads on such rigs by about 50 per cent, because of ignorance in progress of data refinement.

As with the Crystallography database, one benefit is qualitative, associated with the validation and extensive reworking of data and its presentation in an immediately usable form.

It would theoretically be possible for a highly qualified engineer to locate the published data for himself, and to perform the sort of synthesis which is carried out by ESDU, but it is doubtful that the same level of quality and validity could be attained, and it is probable that the cost would be of at least the same order, that is an average of £12,000 for each Data Item. Its availability therefore represents a considerable saving of time and resources, and it is interesting that one user volunteered the cost of providing equivalent information if ESDU services did not exist to be of the order of half a person per year, or £5,000. This compares with the Crystallographic figure. One user said that copies of the data published so far would retain their utility for a long time, it would be a disaster if they vanished, and he would fight to the death to keep them.

There are some slight indications that the market for printed data sets may be changing, and the move towards provision of computer-oriented services seems wise; it is certain that the existing oversight procedures will continue to be implemented.

The few users consulted reported very frequent use of the data sets, of the order of several times a week.

Future developments

The major future development will probably be an increased emphasis on marketing the ESDU products, and continued development of computer-oriented products. An in-house development will be a move to the provision of typesetting from disk, to replace the existing production of Data Items by typesetting by a printer. An interest in micro-computers is evident, and some further exploitation of the new market opportunities afforded by their increasing availability may be expected.

3. Mass Spectrometry Data Centre

Royal Society of Chemistry, University of Nottingham,
Nottingham NC7 2RD
Tel: 0602 57411

Manager: Mr Stephen Down

Scope: Mass spectrometry and allied subjects such as instrument design and techniques, isotopic analysis, chemical analysis, organic chemistry, atomic and molecular processes, thermodynamics and reaction kinetics.

General description: The Mass Spectrometry Data Centre was established in 1966 at the Atomic Weapons Research Establishment, Aldermaston, following a study initiated by the Office for Scientific and Technical information of the requirements for such a Centre. The Centre's remit was to produce a current awareness bulletin, to set up a collection of spectra and to devise methods of identifying unknown substances using computerised techniques. Its initial support was provided by OSTI, followed by joint support from OSTI and the Ministry of Technology, and subsequently by the Department of Industry. The Centre's location imposed certain constraints on its ability to market services in a full commercial sense, and it was never in a cost-recovery position while it remained at Aldermaston, although by 1970 the *Mass Spectrometry Bulletin*, which was distributed by HMSO, had 700 subscribers, of whom 80 per cent were outside the United Kingdom.

By 1978, financial constraints made it necessary to seek an alternative location for the Centre, and in the middle of 1978 it was transferred to the Chemical Society (now the Royal Society of Chemistry). The Department of Industry fully supported the Centre for nine months, during the transition period, and then provided support for a further three years to cover losses until the Centre became self-supporting. Financial self-sufficiency within the Information Services Section of the Royal Society of Chemistry was achieved by March 1982.

The Centre is now housed in accommodation leased from the University of Nottingham, and has a separate budget of approximately £150,000 a year. It has three professional and three clerical staff, plus support from other departments of the Information Services Section, including computer support. The computer support consists of an IBM 4331, two PDP 1170s and an ICL System 4 which is being phased out this year; these computers serve the whole of the Information Services Section. MSDC also uses the University Computing Centre to process the photocomposition suite for typesetting the *Mass Spectrometry Bulletin*, but will have to seek other resources when the University phases out the machine on which this is processed.

The technical activities of the Centre are overseen by a Technical Advisory Committee which meets six-monthly. Its members are appointed by invitation, and represent industrial, academic and government interests.

Input acquisition and processing

Input material is identified by scan of some four hundred journals, supplemented by searches in Chemical Abstracts, Atomindex and other services. Some of the material is identified in the libraries of the University Chemical and Medical Departments. The bibliographic references of relevant material are indexed from a standard vocabulary of about 300 terms, and a free language index is also generated. These indexed references form the input to the *Mass Spectrometry Bulletin.*

Data for inclusion in the Mass Spectrometry Data file is identified from the Bulletin input, and when the existence of a spectrum is noted, the author is requested, by a standard letter, to donate his data to the collection. (If the Centre becomes aware of the existence of larger collections of spectra, it takes steps to acquire them). Input on a standard form is requested, but is accepted in any form. The data received is initially validated by inspection, then input to an online batch system on a PDP computer which applies a number of checks to the data. Printout from this process is returned to the contributor for check, and for completion of details regarding the instrumentation. On return it is then added to the MSD collection. Input cost of one spectrum is of the order of 20 dollars.

Output

A major product of the Centre is the *Mass Spectrometry Bulletin*, which appears monthly and contains bibliographic details of articles relevant to mass spectrometry. Each entry gives a serial number, a title, author, source and CODEN and subject terms. It has a Subject Index based on a fixed thesaurus of 306 terms. Terms not allowed in this index may be included in a General Index which is an open index divided into 9 subsections (atoms, molecules and ions; compounds (and types, applied use etc); conference sites; elements (as filaments, targets etc); geological and extra-terrestrial; materials (alloys, chemical systems etc); medical (pharmacological, body organs etc); natural species; miscellaneous). When sufficient mass spectral data is given, compounds are selected and placed in the Compounds Classification index which lists article numbers under one or more of 79 group classifications. Elements and atomic ions mentioned in articles are added to the Elements Index. The *Bulletin*, which is computer typeset, carries around 10,000 references annually, and some sample entries are given in Figure 4. It has 500 subscribers, at a basic subscription cost of £165. Approximately 78 per cent of the subscribers are overseas, and 11 per cent receive their copies by air mail.

The *Bulletin* has also been available since mid-1982 from Pergamon Infoline. The full backfile of approximately 110,000 records is available, and about 30 users were reported in the third month of availability. 7,000 of the spectra from the Mass Spectra file are available on date sheets. The spectra

8160 Thermochemistry and dissociation dynamics of state-selected C4H8O2(+) ions. 1. 1,4-Dioxane
Fraser-Monteiro M.L., Fraser-Monteiro L., Butler J.J., Baer T., Hass J.R.
JPCHAX J. Phys. Chem. V.86 N.5 P.739-747 1982
Appearance energy, Coincidence methods, Dissociation, Ionization efficiency, Ionization energy, Kinetic energy, Molecular ions, Photoelectron spectrometry, Photoionization, Thermodynamic quantities, MIKES, 1,4-dioxane

8161 Thermochemistry and dissociation dynamics of state-selected C4H8O2(+) ions. 2. Butanoic acid
Butler J.J., Fraser-Monteiro M.L., Fraser-Monteiro L., Baer T., Hass J.R.
JPCHAX J. Phys. Chem. V.86 N.5 P.747-752 1982
Appearance energy, Coincidence methods, Ionization efficiency, Lifetimes, Molecular ions, Photoelectron spectrometry, Photoionization, Thermodynamic quantities, Butanoic acid

8162 Thermochemistry and dissociation dynamics of state-selected C4H8O2(+) ions. 3. Ethyl acetate
Fraser-Monteiro L., Fraser-Monteiro M.L., Butler J.J., Baer T.
JPCHAX J. Phys. Chem. V.86 N.5 P.752-757 1982
Appearance energy, Coincidence methods, Dissociation, Ionization efficiency, Molecular ions, Photoelectron spectrometry, Photoionization, Thermodynamic quantities, Ethyl acetate

FIG. 4. *Sample entries from the Mass Spectrometry Bulletin*

are arranged in line diagram and tabulated forms, including m/e values, relative intensities, formula, molecular weight and source. These are sold at £90 per thousand, and are available in single copies.

Both the *Mass Spectrometry Bulletin* and the Mass Spectra Data file consisting of approximately 25,000 mass spectra including the ASTM, DOW, API/TRC and MSDC collections are available for sale on magnetic tape, at a 1982 price of £2,050 and £1,000 respectively. (Some two or three sets of Data tapes have been sold). The tapes are marketed without search software. The Mass Spectra file is supplied to the NIH/EPA Chemical Information System in the United States, and is available via Telenet; CIS allows input of spectra to find matches, and also allows peak-by-peak searching. The file is supplemented in the United States, by some contracted-out measurement of gaps.

The principal in-house use of the Mass Spectra file is to provide input to the third major product of MSDC, the Eight Peak Index of Mass Spectra. The Second Edition contains the eight most abundant ions in 31,101 mass spectra indexed by molecular weight, elemental composition and most abundant ions. A literature reference to the entry in the Bulletin is provided. A sample of the Index is given in Figure 5. The Index is available in hard copy (4 volumes) at a price of £250, and is also available in computer-readable format at a price of £1,000. About a thousand copies have been sold since its publication in 1975. A Third Edition is under active preparation. It is expected to cover about 50,000 mass spectra, at a prepublication price of £450.

There is no restriction in principle to prevent online availability of the Mass Spectra Data file in the United Kingdom or Europe.

MASS TO CHARGE RATIOS								M.W.	INTENSITIES								Patent
202	67	159	144	118	51	130	131	**202**	100	43	38	34	28	20	17	16	
119	202	43	83	68	91	120	201	**202**	100	68	55	53	19	12	9	9	
77	105	160	43	51	102	50	202	**202**	100	98	71	62	61	59	30	30	
57	127	43	41	159	55	109	160	**202**	100	71	34	25	16	16	9	5	**0.10**
71	43	41	42	55	63	69	72	**202**	100	98	35	35	28	20	17	6	**0.00**
98	31	140	129	145	85			**202**	100	45	18	15	12	5			**0.00**
75	41	117	55	19	43	97	45	**202**	100	34	33	31	22	22	19	19	**0.50**

C	**H**	**O**	**N**	**Cl**	**Br**	**F**	**S**	**P**	**B**	**D**	**Si**	**X**	COMPOUND NAME
11	10	2	2	-	-	-	-	-	-	-	-	-	**6-methyl-1-phenyl uracil**
11	10	2	2	-	-	-	-	-	-	-	-	-	**6-methyl-3-phenyl uracil**
11	10	2	2	-	-	-	-	-	-	-	-	-	**3-acetylamino-5-phenylisoxazole**
11	22	1	-	-	-	-	1	-	-	-	-	-	**Nor-propyl thiol nor-octanoate**
11	22	3	-	-	-	-	-	-	-	-	-	-	**Di-nor-amyl carbonate**
11	22	3	-	-	-	-	-	-	-	-	-	-	**1-hydroxy-5-nonanone ethyleneketal**
11	22	3	-	-	-	-	-	-	-	-	-	-	**Methyl 3d-methoxynonanoate**

FIG. 5. *A sample of The Eight Peak Index of Mass Spectra*

Distribution mechanisms

Marketing of MSDC products is through the Royal Society of Chemistry, and is promoted by travelling representatives, journal advertisements, representation at conferences and by direct mail using Kompass and other directories. Following takeover by the Royal Society of Chemistry, considerably greater effort is devoted to marketing.

Staff training and recruitment

There is no specific staff training other than on-the-job training, and recruitment is handled by the Information Services Section. There is no user training other than the manuals provided by Pergamon for use of the Infoline service.

User aspects

The major use of the information produced by the MSDC is the identification of unknown compounds, essentially by matching their spectra or other measured characteristics against the data available from MSDC. The user community is therefore extremely widely distributed, in medicine, forensic science, pharmaceutical, food and other industries, pollution and effluent monitoring and control and many other areas. It is very difficult to quantify the potential market. It seems likely that many users are only potentially interested in subsets of the full database, so that sales of the full base may be unrepresentative of demand for mass spectra. Some thought is therefore being given to the possibilities of subsetting the database.

Cost-benefit considerations

As with other services, some benefits are qualitative, relating to the validation of the data, although the validation processes are not as rigorous as may be the case with Crystallographic data. The algorithmic check supplemented by author checks provides sufficient rigour, so that the user has a degree of increased confidence in the quality of the data presented. It would be possible for a user to search the literature on his own account, and to write for details to relevant authors where necessary, but unquestionably there is a quantitative benefit in having mass spectral data readily available in a consolidated form. It does not seem possible to estimate the amount of time saved or to put a value on the convenience of availability of MSDC data; the value is related to the frequency of routine analyses performed, and to the nature of the compounds handled. Mass spectrometry is only one among a number of techniques available for analysis, and is not applicable to all compounds. However, users of the Eight Peak Index and other services value them, and consider that their non-availability would involve them in extra cost.

Future developments

There are possibly 6 million known compounds, and possibly 600,000 mass spectra have been determined, so that the present database covers only a part of the total area, and it is apparent that in terms of receiving input it can continue for a considerable period of time. However, techniques change and some thought is being given to the extension of coverage into other areas, such as fast-atom bombardment and chemical ionisation; development into these areas is being pursued.

Other possible developments would involve the production of subsets of the presently-held data, either as custom-made packages or standard packages. Such subsets could be designed for use on micro-computers, and would probably be supplied on hard disk. Developments of this kind will be conditioned by marketing factors.

Adaption, extinction or genetic drift?

Blaise Cronin
Aslib Research and Consultancy

This article is based on a presentation given at ICI's Company Information System Managers' Annual Conference, April 1983.

Introduction

DANIEL BELL'S POST-INDUSTRIAL SOCIETY is characterised by an enormous shift in occupational ratios, most clearly seen in the displacement of workers from manufacturing industry and agriculture to service and support functions within technologically developed societies.[1] Toffler,[2] Porat[3] and Machlup[4] are among those who have helped us to understand what is meant by an information economy. In the wake of these large canvas painters has come a succession of Sunday painters of our futures. Scenario spinning has almost become an acceptable professional activity in its own right. Those who engage in this pastime constitute the collective antenna of a society awaiting the arrival of the 'third wave' (in passing it is worth noting that there is already talk of the 'fourth wave'). Individuals and governments struggle to reconcile the messages sent out by futurologists and think-tanks, eager to find a scenario which either suits their particular purposes, or can be used as a basis for policy making and strategic planning. The scale of change afflicting existing structures and ways of thinking has given rise to a new vocabulary. One has only to look at the professional literature of almost any field to stumble across such terms as 'future shock', 'adaptional breakdown', 'coping behaviour', 'cultural lag', 'deinstitutionisation', 'serial careers', 'life-long learning', 'info-sphere', 'deprofessionalisation'. These terms have become part of a global 'new-speak' associated with transience and change—change which is endemic, rampant and disrespectful of traditions and *idêes reçues*. We live, Toffler tells us, in a 'blip culture'; that is to say, a world which is defined in terms of fragmentation, disassociation and contingent classification. If events themselves are confusing, the variety of solutions and interpretations is no less so. Our harried acceptance or rejection of what futurologists tell us is accompanied by a sense of unease and a tendency to indulge in 'adhocratic' planning. Quick thinking may be called for when the carpet is being pulled from under one's feet, but instantaneous reactions are not always dignified or for the best.

The information profession

Perhaps nowhere else are the reverberations more acutely felt than in the information profession. Information, we are told, has become the life-blood

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of the 20th century: it has been reified, and spoken of in commodity terms (there is also talk of information as an anti-commodity). Information is seen as a facilitator of change, a disturber of traditional relationships and alignments, and as the future basis of financial, political and societal power.

For centuries information handling has, in a certain sense, been the preserve of a select group of appropriately trained individuals. Over time the information profession has developed and refined its various roles as preserver, codifier and deliverer of information. Its 'social mission' has been supported by the development of a corpus of procedures, tools and techniques, and these in turn have helped to give the profession status and respectability. By the mid 20th century the information profession had a fairly confident view of its place in, and contribution to, society at large. Generally speaking, the setting up of professional associations, norms, codes and ethics, international co-operation, networks, standardisation and education programmes are indices of professional maturity. All of these trends or features can be seen in the evolution of the information profession. Until recently the profession's strength stemmed from the fact that it operated as society's institutionalised information retailer. The universal non-availability of information allowed the profession to fulfil a useful role at the societal, organisational and individual level. In many cases access to information was, and is, via designated institutions. Information tends to flow into, through and out of specially designed institutions, and to no small extent access to information is facilitated by such institutions (e.g. information centres, libraries). Information systems tend to be based in, or geared to the processing and organisational requirements of institutional information centres. This pattern has, however, begun to change. Accelerating developments in computing and communications technologies have in a very short space of time begun to crack the mould. Terms such as 'end-user access', 'libraries without walls', 'distributed processing', 'information self-reliance' all signify the shift from the institution to the consumer. This 'liberalisation' of information has resulted in a shift in the 'balance of power', and in the nature of the relationship between institutional storage and delivery systems and information users. Additionally, this has created a kind of cognitive dissonance within the information/library profession as a whole. This can perhaps be explained in terms of the gradual disappearance of 'epitome districts' (to use the jargon of urban sociologists) within the professional landscape and the burgeoning of what Kalba terms 'infobusiness'.[5]

Those who predict the demise of the information/library profession as traditionally constituted tend to view the information professional as a latter-day dinosaur or brontosaurus, unable or unwilling to come to terms with a changing landscape. What is most revealing about these analogies is their inflexibility; invariably the projections are linear, based on fuzzy data and 'surprise-free'. And, of course, the whole point about the 'third wave' is that it is going to drench us in surprises. What I'm trying to say is that the pundits have in their psittaceous endorsement of the Darwinian principle of adaption or extinction failed to acknowledge the possibility of multi-layered or differentially-phased impacts, and have failed to take account of what

Toffler, metaphorically, refers to as the concept of 'genetic drift'—the possibility of adaption, not along expected lines, or on some formula basis, but in an impromptu, unforeseeable and essentially non-deterministic fashion. Having said that, it is only proper to concede that the dinosaur analogy may well prove accurate in certain cases, for certain professional sub-groups working in certain types of environments. My objection is that the profession's seers have not shown themselves willing to entertain multiple possibility sets, and have effectively eschewed any form of cross-impact analysis. Overall, our profession's do-it-yourself crystal ball gazing has been one-dimensional (Wight's[6] study on the impact of the new technologies is a notable exception). I am not for one moment advocating an end to speculation or debate: future-orientated thinking is essential, but the quality of some of that thinking needs to be improved on. Naisbett, in his recent best-seller, makes more or less this point: 'The gee-whiz futurists are always wrong because they believe technological innovation travels in a straight line. It doesn't. It weaves and bobs and lurches and sputters!'[7]

Access to information

The information/library profession is at the epicentre of the so-called information revolution. This 'revolution' has less to do with the growth or volume of recorded information worldwide than with the fact that technology appears capable of de-institutionalizing information, and handing over access to the individual. The public at large is being sensitised to the mass-availability, importance and profitability of information for both personal and corporate use. More and more, the notion of 'information needs' is used as a marketing lever for information technology producers. The 'right to know' is also a commercially advantageous slogan for the IT manufacturer and salesman.

What use the technology if unharnessed to need? What better than to convince the public that it has information needs, that it has a right to know which ought to be defended? The product is not then an end-in-itself; rather is it a socially essential tool or medium at the disposal of the individual. Thus, we are urged to develop an information consciousness, to become a member of the interactive electronic community and to understand and satisfy our information needs. To quote Toffler again: 'All sorts of occupational groups from librarians to salesmen began clamoring for the right to call themselves professionals . . . our culture is dominated by professionals who call us *clients* and tell us of our *needs*.' In theory, information technology along with the systems and networks it spawns can and does beneficially affect individuals', organisations' and governments' performance, but this honest conviction ignores one or two things. In fact, sweeps to egalitarianism and promises of equality of opportunity (and access) are nobbled by cultural, income, educational, developmental and behavioural differences between individuals, and between social groups. Invariably, something like a Pareto's Law of Opportunity of Access seems to operate: 80 per cent of opportunity being cornered by 20 per cent of the marketplace.

This has led certain sections of the profession to believe that the present expansionist spiral (in the information technology and services industries) will result in a widening gulf between the 'haves' (the information rich) and the 'have nots' (the information poor), which in turn will raise all sorts of ethical and practical questions regarding the individual's right of free access to information.[8] On one level, present trends seem to suggest that the information profession may be about to develop a new role as a public watchdog and access facilitator for the 'have nots'. On another level, with the emancipation of the 'haves' (the informationally independent segments of society) the information profession is likely to loose a significant chunk of its traditional (captive) user community. In certain contexts, therefore, there seems little doubt that the institutional information provider will become an extinct species, but in other contexts new roles and functions may evolve which inspire a section of the profession to reformulate its mission statements, redefine its goals, *and* at the same time provide it with new justifications for public or corporate subsidy. We need, therefore, to think not in terms of a single path or pattern of change, but in terms of multi-faceted change: high-low; quick-slow; deep-shallow; regular-irregular. The title of a recently published book '*La France a deux vitesses*' provides a suitable image to convey the sense of the phenomenon of differential impact.[9]

The prospects for change

It may well be that Messrs Clough and Lewis (to mention two commentators with ICI associations) are 100 per cent correct in maintaining that the 'traditional information people', based in traditional information units (individuals who are more facilities than business orientated) will become superfluous as information generation, manipulation, transmission and retrieval becomes increasingly decentralised within large organisations.[10,11] This trend towards professional obsolescence will establish itself first and most noticeably, in large corporations, multinationals, R and D laboratories, financial institutions and large governmental departments or agencies, for the good reason that in such environments there is scope for relatively large-scale investment in computing and telecommunications systems, plus a willingness often to engage in in-house design and experimentation. In the small business community, in not-for-profit organisations and in the public sector generally (not to mention the domestic market) the impact and penetration of information technology will be uneven and essentially whimsical, *unless* there is a significant increase in government-sponsored awareness programmes (such as IT '82 in the UK, or in France, for instance, the work of MIDIST, the inter-ministerial body concerned with the promotion of information). At present the 'informatisation' of society is very much consumer-led (witness the phenomenal growth in the sale of small computers) rather than state-stimulated or technology-driven (witness the nugatory impact of Prestel on the UK domestic market). This being the case, the information profession will be less radically affected in the short-term and better positioned to devise adaptive strategies, to accommodate novelty and to capitalise on the positive side-effects. This, I would argue, will prove to be the case, even allowing for projected continued decreases in hardware, storage and telecommunications costs, and the growing computer literacy of the population as a whole. Information means different things to different people at different times in different contexts. The way in which information is perceived, the nature of an individual's information needs and the character of the information sought (not least in terms of urgency) are all a function of professional or private circumstances and conditions. If we accept this none too controversial proposition then we are more or less compelled to accept that the impact of IT on professional roles and traditions will be uneven. A certain caution is needed before generalizing on the basis of particulars. For instance, on-line airline reservation systems are both costly and sophisticated (in computer terms). The sophistication required of such systems makes heavy financial outlay unavoidable, but the nature of the airline industry, in terms of its competitiveness and dependence on high load factors, is such that ventures of this kind not only can, but must be undertaken. Information technology developments in the airline business, or even ICI for that matter, represent the leading edge of IT applications; they demonstrate what can be achieved, but it does not necessarily follow that this level of sophistication can or will become the norm. Consequently, we have to consider the knock-on effects on traditional information and library environments in terms of what is happening, or is likely to happen, in *specific* operational environments. The contraction and displacement described by Lewis in relation to technical information services within ICI may indeed prove to be an increasingly common pattern, but it may only be so in organisations or contexts where the adoption and sponsorship of IT is actively and critically encouraged as a matter of policy. The downwards impact of IT is in some respects fitful and haphazard. After all, change can be variable even when the catalyst is universal.

I don't want to labour the point, but pronouncements to the effect that the profession is moribund or obsolete need to be viewed with a modicum of caution. However, in order not to appear ostrich-like I shall concede that extinction is a probability in certain situations for the reasons already touched on. On the other hand, the threat of extinction typically engenders an adaptive reaction of some sort, and I'd like to dwell on this for a couple of moments. The old adage 'change or be changed' suggests an 'either-or' deal. In reality, I suspect that the resultant transformations, regroupings, or whatever, effected by the threatened species are a by-product of innovation reacting with local conditions, mores and attitudes. Technology, it is worth remembering, is not an independent variable in social calculation.

Adaptive reactions

Adaption in relation to the information profession can occur on two levels. There can be surface change and there can be deep change. At the surface level we recognise that changes in organisational structures and work styles are happening *and* that they will affect the traditional way of doing things.

It is now fairly widely accepted that attempts to revitalise and redefine goals are called for. Thus, the profession has been reviewing its service delivery philosophies and mechanisms. There is evidence of a shift from a passive or reactive to a proactive mode. This entails evaluation exercises, the design and promotion of new systems and facilities, investment of time in user education and sensitisation programmes, client group analysis, and the acquisition of new and relevant professional skills and competencies for those already 'in the field'. So, while accepting that change is upon us and that the logic of the extinctionists' position is valid, we nonetheless seek to preserve the essence of institutionalised service (for it is this which has traditionally conferred meaning and coherence on our concept of 'the profession'), by enhancing key aspects of the overall service. In a sense, we move, more or less consciously, towards a marketing approach to the management of the information function. Marketing, despite its fairly recent injection into the rhetoric and practice of professional information and library work, is certainly not a panacea. There are a number of reasons why this is so, but, basically, there *is* (theory notwithstanding) a considerable difference between the marketing of services and the marketing of consumer goods and products. Other points to be taken into consideration are as follows:

- information and library services are not self-evidently good (however much we may care to believe otherwise) in the way that fire services or a national health service are held to be;
- information services are usually undercapitalised;
- information and library services do not as a rule have access to risk capital. Nor have they traditionally recruited or attracted staff concerned to develop the financial base of the service;
- in the majority of cases, whether in the private or public sector, information and library services have espoused a free-access policy. The lack of fee-based services (usually seen as being antithetical to the spirit of 'the profession') makes the information professional seem relatively naive from a cost accountancy viewpoint;
- more and more, the functions traditionally associated with information intermediaries can be performed by the end-user. This weakens the profession's claim to be unique, essential and irreplaceable;
- information services have not, in the main, been noted for their interest in evaluation, performance assessment and cost-benefit analysis. This, too, may create a negative impression with those who underwrite the service.

There is one additional aspect to be noted, and that is the fact that information professionals, unlike product manufacturers, have to market themselves *and* their services to *two* constituencies. A company launching a new sports car model will channel its entire energies (not just those of the marketing and advertising divisions) into promoting the product to a predetermined segment of the car-buying population. The corporate marketing effort is focussed squarely on the potential purchaser, with the objective of

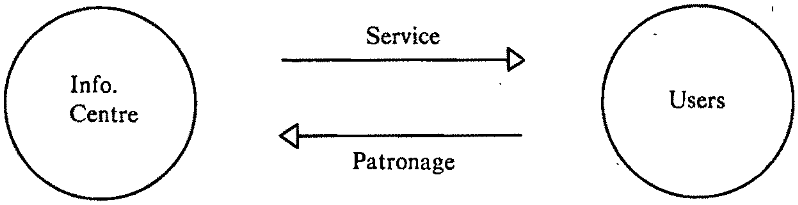

FIG. 1 *Information services: apparent exchange relationship*

convincing him of the product's qualitative excellence. The exchange relationship is fairly straightforward: cash for car. As far as information services are concerned the exchange relationship seems to consist of service for patronage (see Fig. 1).

If this were the full story then information centres would be primarily concerned with a marketing approach geared to *resource allocation.* However, information and library services differ from car manufacturers: information services are not income generators and are not profit-motivated. Furthermore, they operate in a protected environment, largely untroubled by commercial

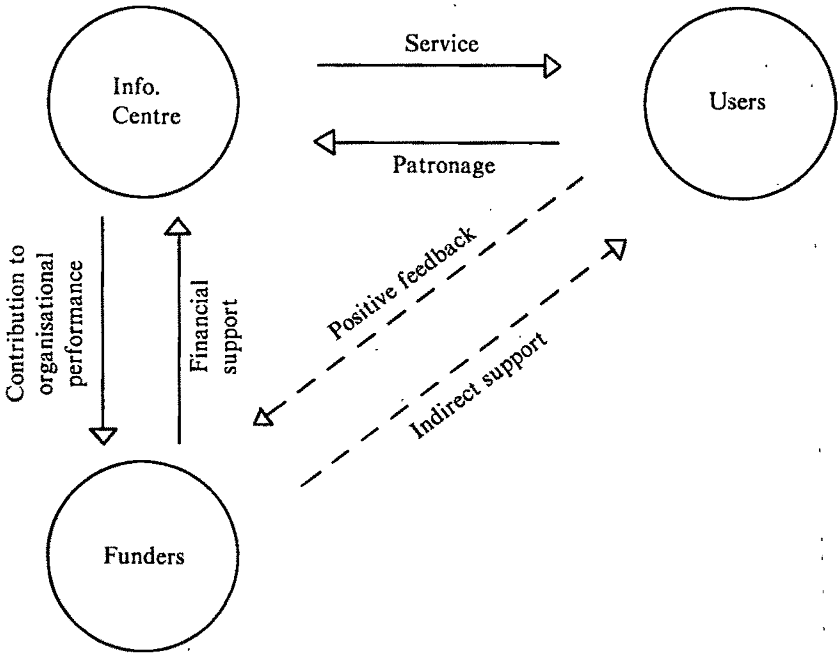

FIG. 2 *Information services: actual relationships*

pressures or competition. Most importantly, information services are also involved in the difficult process of *resource attraction*, in that they have to attract both moral and financial support from the parent organisation, local authority or government. For information professionals marketing is a two-fold activity, and, as such, is, arguably, twice as difficult. Two constituencies have to be addressed, and these tend to be different in terms of size, expectations, composition and world-views. Both these constituencies need to be cultivated, convinced, manipulated and nurtured. We are not, in fact, dealing with a dyadic relationship as suggested by Fig. 1, but with a triad (see Fig. 2).

The academic librarian has to please students and faculty in terms of the range and quality of services on offer, but must also satisfy senate that funds for the university library system are a priority when it comes to UGC grant allocation time. The city librarian has to convince a diverse user population that the service is responsive, caring and appropriately structured in the best interests of the community, and at the same time he must persuade the relevant council committee that the library service merits significant rate-support. The corporate information officer, while trying to satisfy the needs of R & D personnel, technicians and administrators has to fight to demonstrate to the Chief Executive that the contribution made by the service to overall organisational performance is meaningful and measurable.

The corporate information centre

Let us concentrate for a moment on the corporate information centre. Meltzer[12] points out that you have to market three things: (i) yourself; (ii) your information products and services; and (iii) the information centre itself as a focal point within the parent organisation. His three 'I's' of marketing are the Individual, the Information and the Information Centre. Thus, the Information Centre circle in Fig. 2 in effect comprises three elements. This distinction really is important, for if senior management is unimpressed by, or unfavourably disposed towards, *you*, then there is an odds-on chance that this disaffection will be generalised to the service as a whole. Let me put it this way: a responsive marketing philosophy will not guarantee the survival of your information service, but it should at the very least make closure less likely. Some interesting evidence to support this view was recently produced by Matarazzo,[13] who investigated the factors contributing to the closure of a sample of corporate libraries in the US. His conclusions are worth noting, and are summarized below:

- the relative importance of the corporate library service (at any given moment) is linked to (i) the company sales performance and (ii) the level of company investment in research and development;
- senior managers responsible for closure decisions were unlikely to be users of the corporate library service, and also unlikely to have much direct knowledge of the value or use of the library service and collections;

- management will make decisions on closure without seeking the views of those outside its immediate circle;
- closure and lack of in-house evaluation by the library service seemed to be related;
- proximity to, and availability of, external information or library services seemed to be associated with closure;
- the information professionals affected had little first hand knowledge of when a financial crisis was looming, or when the organisation was contemplating major evaluative exercises.

What can we learn from this? In a nutshell, that there appears to be a strong correlation between closure and the absence of a clearly formulated marketing strategy within the information/library service. Basically, the decision-to-close is associated with a communications failure within the organisation. And marketing, as we have so often been told, is fundamentally an attempt to open up communication channels between service providers, their publics and sponsors.

Clearly those corporate information professionals included in Matarazzo's study had not read Meltzer's publication (*Marketing yourself in your organization*) alluded to earlier. Meltzer provides a number of sensible recommendations on how to market the information centre more effectively. First, he says: 'Know your organisation! Define which areas are on a growth curve and which groups are phasing out. Is there a shift from research and development to production? Have new divisions been created to expand your organisation's activities'. He then goes on to say: 'To market yourself in your organisation you must *meet and service those individuals who operate at the macro-organisational level.* The important thing is to speak to these people in *their language.* And the language of management is a *quantitative* one' (italics added). Moving on to segmentation, he argues that profiling, needs analysis and targeted service delivery are essential: 'There are the operating level personnel who need detailed information to perform their jobs. There is the middle management stratum which needs broader based information for planning, scheduling and auditing a task or mission. Then there are the executives who need digests, summaries and synopses to make decisions regarding policies and procedures and solve problems that require corrective action or innovative approaches.' Having recognised this, the information professional must then attempt to relate the products and services to the present and potential needs of different user groups, and when introducing new features or services think in terms of the life cycle concept and the probability of user acceptance. Underlying all this should be a concern to package, deliver and brand products from the information centre in such a way that an integrated, unified and professional impression is conveyed to the user.

In all of this the 'bottom line' should be user convenience. It is this factor which should determine the mix of support technologies, rather than the other way around, i.e. the adoption and implementation of information handling technologies should be based on what is *known* about the users rather than on an assessment of the technologies *as* technologies. Lastly, Meltzer mentions the importance of user education and orientation programmes and the value of dynamic promotional activities within the organisation. On top of Meltzer's proposals, I would tend also to give considerable emphasis to the need for the information centre to act as a boundary spanner, i.e. serving as a link between internal and external information sources. To achieve these objectives the information professional needs to know his 'patch', to be *au fait* with IT developments and their probable implications, to be technically sound and professionally competent. But, most important of all, he needs to be able and willing to deal face-to-face with senior members of the organisation, whenever possible developing informal contacts and working himself onto committees, project teams or matrix management groupings. To do this requires a degree of self-determination, inter-personal skills, dynamism and ambition not always demonstrated by members of the information profession at large.

The sort of positive approach sketched above may still not be enough in the face of cumulating change-induced pressures. It may be that events will streamroll even the best managed and best marketed information centre. This could even prove to be the case where the information centre operates (as for example within Smiths Industries Ltd.)[14] on a cost-recovery basis in direct competition with alternative internal and external information sources, suppliers and consultants.

Alternative scenarios

If surface changes of the kind proposed above are not necessarily going to ensure the continued existence of the institutional information service, what then are the options available to the dedicated, adaptable and forward-looking information professional? One tack may be to foster a new corporate role which is not tied to the existence of the institution variously referred to as the library, information unit or corporate information centre. If the move to distributed processing, electronic publishing and communication, end-user database searching and automated office systems continues apace, then there is little doubt that many organisations will require a new breed of information 'supremo' to plan, oversee, manage and evaluate integrated information handling systems. Technological convergence seems to offer prospects for a new career path within corporate and administrative contexts, which is loosely labelled as information management (IM) or information resources management (IRM). Already, there is shuffling in the wings as communications experts, data processing managers, librarians, MIS people, systems analysts, information scientists, marketing personnel, records managers and computer scientists covetously eye this virgin territory and wonder how to stake their claims. At the same time academe is reflecting on its future role as a training ground for the information manager. Horton has written extensively on the information management profession, both in public administration and the private sector, and a new body of literature seems to be in the making.[15] Significantly, a number of the top Fortune 500 companies have (or soon will) vice presidents for information. If the demand is real, then some modification in existing educational programmes will be called for to turn out graduates capable of meeting employers' expectations. Who should provide these educational programmes? As yet, it is not entirely clear which 'educational guild' is best positioned, most interested or most willing to take the initiative (there are sensitive 'turf' issues to be resolved), but early signs suggest (at least in the US) that schools of information and library science will respond to the challenge. A number of US schools currently offer Masters degree programmes in IM, IRM and Records Management. A number of programmes grouped under the label 'Information Science' are also available, which to a greater or lesser extent have been geared to the new job market and its requirements. Other institutions are in the process of launching programmes in Communications Technology, Information Technology and related areas. A number of significant, as well as a number of cosmetic, changes have been made, and the 'domino' effect being what it is, more can shortly be expected.

The professional needs of this 'new breed' are not wholly satisfied by any of the many existing associations, and the emergence of AIM (Associated Information Managers) is one further indication that a new profession (or professional élite) is emerging from its chrysalis. Without doubt, a number of the pioneers in the information management field have established considerable personal reputations, and in so doing convinced employers, educators and students that the potential is there. The opportunities do exist, but their exploitation calls for considerable verve. A fresh enthusiasm will be required if the traditional information profession is to colonise this *terra nova*. There will be an emphasis on technology, inter-personal skills, marketing, diagnostic skills, and the ability to evaluate and manage mathematically. The comfort of the four-walled institution (be it the library or the technical information centre) will no longer be there, but in the long run the rewards and the scope for personal and professional advancement may be greater.

This is one scenario in which threat is converted to opportunity. But it is only one. The appealing thing about the concept of 'genetic drift' is that it allows for others, some of which we may not yet even have begun to think about. That possibility, however, should not be construed as an invitation to sit back and let events take their course.

I began by making a passing reference to the monumental contributions of Machlup and Porat to our understanding of information's place in society, and I would like to close by quoting a short extract from an article by Cooper (*The structure and future of the information economy*) in which he compared the approaches, methods and conclusion of these two economists. In Cooper's view:

> 'The information economy can be divided into information products and information services and the evidence suggests future growth will take place in the information products portion of the sector. The implication of this finding for the library profession is that we cannot expect the demand for the services of

> librarians to increase simply because we have entered an information age. The concept of an information economy has many meanings and only a small part of it pertains to traditional library activities. The skills that a person with library training possesses are certainly relevant in the broad information economy. The challenge is to *market* (italics added) those skills.'[16]

The assessment and the message, it seems to me, are both about right.

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Monitoring the demand for the services of academic libraries—interpreting survey evidence

Saxon Brettell and Jim Basker

Portsmouth Polytechnic

Introduction

IN A PREVIOUS ARTICLE[1], the authors suggested that surveys could usefully provide monitoring information for management of capital services in libraries, such as seating, because of the complex interdependencies between users' behaviour and the provision of services reflecting a joint supply or joint demand relationship—or both. The authors then suggested a utilization quotient as an especially useful summary statistic for analysis and applied this to a particular survey of an academic library.

The purpose of this paper is to consider how the rich variety of results from such surveys might be used to draw appropriate conclusions on the behaviour of library users, and to consider further the methodological issues raised in interpretation of survey results. The paper uses as an example some of the results obtained by the authors from a two-year survey in the Frewen Library at Portsmouth Polytechnic.

Problems of inference from library samples

It is dangerous to infer that behaviour patterns of a population are directly reflected in the behaviour of library users working in a library building. It is important to distinguish the population being sampled. Clearly a sampling frame based on seats within the library has some practical advantages and is relevant to important policy variables under library managers' control: But if broader inferences to student study patterns are to be made in an institution, they need to be considered carefully. Notably, a regular in-library survey should be validated by external information whenever possible. Ideally, this would be by contemporaneous surveys based on a wider sampling frame, and in the case of the study cited such a survey was carried out institution-wide.

One of the more important problems of surveying at regular intervals of time in a library is the 'over-representation' in the sample of heavy users of library services. This will be reflected for example in the information on duration of time spent in the library and in the rate of repeat surveys of individual users. If the survey is designed appropriately the bias from this source can, fortunately, be eliminated by reweighting, although for library

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policy such users are important in their own right. For the rest of this paper *duration of use* will be examined in detail.

In setting up a sample survey it is, of course, important to ensure no extraordinary events of a foreseeable nature in the survey period. Unfortunately the influences that affect duration of use are varied and complex, by the very nature of the population being surveyed, and it may be that phenomena distorting duration of use will only appear in examination of the survey responses. It is necessary in such circumstances to use a statistical control for these events in analysing results and drawing appropriate conclusions. A statistical model is the conventional device for such analyses. If there are numerous influences on library users that are approximately independent, a normal error distribution would be justified for these components.

Clearly some of the variables affecting duration of use may have a substantial effect; some of these will be anticipated, others will emerge upon questioning and some will have policy implications. A statistical model that separated these effects would be used more readily for explanation and prediction of duration of use in the future.

Variance/covariance methods are most appropriate in this case because they are designed to handle conditional relationships. These are especially useful if modelled as a regression relationship, particularly if simultaneity effects are present, as in the case of library use during congested periods.

Many of the variables that determine library use are likely to be qualitative (e.g. course of study) rather than quantitative in nature, so the use of dummy variables to reflect the critical characteristics of library users and the special circumstances of their use (location and period, and abnormal factors) provides a useful way of modelling the conditional response of users in a variable such as duration of use.

In the case of students in higher education, who are the dominant academic library users, one has the advantage of a population that is inherently homogeneous with respect to the parameters of age, income, educational attainment, and, perhaps, socioeconomic group. Paradoxically, in making inferences about this population on the basis of identified characteristics, one is likely to have rather poorer predictive ability than if the population were heterogeneous. There is likely to be a higher residual variability than for more varied populations. This means that as much information as possible about the characteristics of the respondents, relevant to their use of the library, should be collected. Some of this information, for example the age and sex of the respondent, has little or no policy content but is designed to reduce, as far as possible, the residual variability in explanations of use. Other pieces of information, for example the purpose of visit to the library, has high policy relevance. A third category of information, that on extraordinary circumstance, may be used to discount information from sources whose use is, in some sense, 'abnormal'.

Correcting for bias in 'in-library' surveys

The comment has been made already that 'in-library' surveys are biassed towards 'heavy users' of the library. Accordingly, if one is making inferences about the larger population of library users it is important to consider ways of taking account of such bias.

TABLE 1. *Survey results with validating survey*

Duration of weekly use, hours		*'In-library' survey* *Without replacement*	 *With replacement*	*Polywide survey*
W/B 10/11/80	Mean	12.4	10.5	8.0
Frewen Library	Variance	68.1	60.7	68.0
	Standard error	.41	.43	.86
	Sample size	404	328	93

Table 1 illustrates the survey results associated with a validating survey and demonstrates the characteristics of the bias referred to. If one corrects the 'in-library' survey for repeated users by eliminating their subsequent reports from the analysis then it is clear that there is a statistically significant difference between the 'with replacement' duration of use and the corresponding validating survey value.

One appropriate way of correcting for bias in the results of 'in-library' surveys is to reweight the information from different 'duration of use' users (controlling if possible for other variables) in the light of the proportions of such users in the broader based sample. This process of correction is quite different from the 'reweighting' associated with taking different groups within the sample and weighting the results in accordance with 'population' weights that might be available, for example from the academic register.

Since validating surveys are much more difficult and costly to administer it is worth commenting on an interesting alternative that relies upon the 'in library' sample being produced by a proper stratified design. In this case, the duration-of-use information may itself be available to help in the correction for bias.

A simple statistical model

Before presenting the formal approach, a simple numerical example will illustrate the operation of the bias.

TABLE 2. *Bias in interpretation of results*

Duration, Hours, X_i	*Population, relative frequency,* F_{pi}	*'In-library' sample, relative frequency,* F_{si}
4	$\frac{1}{4}$	$\frac{1}{6}$
6	$\frac{1}{2}$	$\frac{1}{2}$
8	$\frac{1}{4}$	$\frac{1}{3}$
Mean $\bar{X}$	$\bar{X}_p = 6$	$\bar{X}_s = 6\frac{1}{3}$
Variance V(x)	$V(X_p) = 2$	$V(X_s) = 1\frac{8}{9}$

where $F_{si} = \dfrac{F_{pi}X_i}{\bar{X}_p}$

If the population relative frequency distribution is given as in Table 2 then taking a sample that is based on presence within a library will induce an upward bias in the measured mean duration of use. In this case it can also be seen that the sampling process introduces skewness into the distribution.

In fact, it can be shown formally, that if F(x) is the population distribution then a sampling process will introduce a positive bias into the duration of use, viz:

$$B(x) = E_s(x) - E_p(x) = \frac{V(x)}{E(x)}$$

where B(x) is bias, V(x) is variance, E(x) is expectation, $_s$ refers to sample and $_p$ refers to population.

Hence, the bias is proportional to the variance of duration in the population and inversely proportional to the mean duration of use in the population.

Accordingly a natural way of adjusting for bias is to adjust the measured mean duration of use from the 'in-library' sample by the estimates of variance and mean. That this simple model does not, however, capture all the characteristics of the process of transformation is evidenced by the results of Table 1, where the bias is quite a bit less than this theory would indicate. This is good news, because the bias would theoretically have been about 8 hours.

In fact, it is worth noting that a different bias has affected the Polywide survey, since the response rate was 48 per cent and the evidence of follow-ups indicates a correlation between low response and duration of use.

The factor of bias does affect the regression approach, formally introducing heteroskedasticity, and ideally one would wish to take account of this by an appropriate adjustment. In practice, such adjustment would appear to make little difference in the analyses performed by the authors, and is not reported here.

The issue of congestion

Congestion leads to the worst of simultaneity effects: many factors operate at times of heavy demand which may not operate at other times. For example, congestion in a central, large academic library like the Frewen Library may lead to increased lending and thus less access to library stock because long loan materials are unobtainable; lack of study space means short loan and reference are not convenient. Students may become demotivated. Competition between class teaching and study may occur because seats are available only during classes: a seat and books may be obtained only by skipping lectures. Unsocial hours of work may be forced on students who cause greater pressure on services in evenings and at weekends: these may be part-time students, of course, but services are not always available to them. Notably, dysfunctional use of seating space occurs by readers booking a place early. Thus a survey would show a bias towards long-stay users and a high proportion of reserved seats at a time when the availability of capital stock should be maximised. As a library approaches congestion the number of seats unproductively used may increase. The elasticity of substitution between library and other activities may increase.

To survey a library at its most congested period is to perceive problems at their worst: surveys at other times of day may show spill-over effects of congestion into non-congested demand. There may be fewer reserved seats absolutely, if not relatively; readers may declare fewer hours spent in the library; readers may report a greater teaching load; there may be more part-time students; there may be greater use of short loan, although long loan availability is constant; the distance of a reader's home may be reported differently. *Ceteris paribus*, readers might alter their habits on account of congestion so that the peaks and troughs of library use would be smoothed.

Constraints on readers are numerous, however, if differentiable. Engineers, for example, spend considerable time in laboratories, and cannot avoid intensive desk work before examinations. Social science students, increasingly involved in project work subject to tight schedules, are forced to compete with each other for the same materials in limited study space. It is clear from comments in the survey that despite fierce competition, or perhaps because of the need for group solidarity in the face of rival groups competing for space, the library is a major social centre.

A library manager may reduce the supply of services, alter the nature of services by lending more or providing study-rooms, or persuade the authorities to reduce intakes or increase library space. What should not be done is to confuse supply with demand, and this is the clear danger of relying on reader-performance in conditions of congestion. An appropriate choice of sampling periods is one way to reduce the problem of interdependence for purposes of inference.

Methodological issues in 'data-mining'

Given the poor predictability of library use regression equations, it is important that as large a sample as possible is used and this clearly implies use of computer programmes such as SPSS (*op.cit.* p. 178). 'Data-mining' is an important problem: the process of 'step-wise' regression where a great variety of regression equations involving many variables can be fitted to a given data set and a final selection made on the basis of best fit. It is dangerous not to use an empirically 'fresh' data set to test the validity of the relationship thus obtained. The relationship obtained might essentially be spurious. With the rich amount of data obtained from the 'in-library' survey approach, it is well worth extracting a substantial sample for testing the final set of selected models. If the relationship is stable over this new data set the whole data set can be combined and the chosen relationship re-estimated for final use.

As an example of the type of relationship that might be obtained, the best-fitting relationship obtained for the case of the survey referred to in Table 1 was as listed below, where duration of library use last week (W) is measured in hours. Dummy variables (0,1) relate to particular courses, year of study, accommodation, status, and distance from the library (in minutes).

$$\begin{aligned} W = {} & 7.80 + \underset{(1.89)}{8.46}\ \text{Politics} + \underset{(0.88)}{2.98}\ \text{Year 3} + \underset{(1.85)}{5.54}\ \text{Economics} \\ & + \underset{(2.78)}{9.12}\ \text{Examinations} + \underset{(2.03)}{4.12}\ \text{History} - \underset{(2.14)}{4.50}\ \text{Science} + \underset{(0.82)}{1.36}\ \text{Flat} \\ & + \underset{(5.07)}{8.47}\ \text{Electrical Engineering} + \underset{(1.06)}{1.60}\ \text{Full-time} - \underset{(0.04)}{0.06}\ \text{Distance} \end{aligned}$$

(standard errors in parenthesis)

$R^2 = 0.20$ $n = 328$ $\overline{W} = 10.5$ s.e. $= 7.07$

The overall fit is very poor because of the homogeneity of the population, but the results are interpretable in a reasonable way.

So for a typical full-time engineer in the third year, living in a flat 20 minutes from the library, preparing for examinations, the basic 7.80 hours in the library will be supplemented by a specific 22.2 hours to give 30.1 hours.

Conclusion

It should be obvious that the process of surveying non-monitored library services itself generates thought about important relationships to which attention is not normally drawn in the course of everyday management of a library. Quite apart from substantive results, therefore, a survey does provide an opportunity for library managers to assess the activity within the library and its relationship to activities in the wider institution.

Three principal conclusions should be drawn relating to the interpretation of survey results. *First*, a clearly defined behavioural explanation of library use should be formulated before empirical implementation of a survey. *Secondly*, because of the inherent variability of the population being examined, a well-designed sampling frame and process of analysis is essential.

Aslib Microfilm Service

Mary Ann Colyer
Information Services, Aslib

THE ASLIB MICROFILM SERVICE (AMS) was set up in April 1942, as a document delivery service, unique in its time and vital in importance. Its purpose was to make available in microfilm, or enlargements from microfilm, those journals reaching the UK from enemy and enemy-occupied countries, which would otherwise be inaccessible to the majority of research workers. It performed this function until December 1945. In September 1982, the collection of microfilm negatives was transferred to the British Library Lending Division (BLLD), so it seemed appropriate to note this with a brief summary article about the Service. This article is based on the review of AMS published in *Journal of Documentation* in 1946[1,2]

In the summer of 1941, Aslib secured the support of the Royal Society and the Rockefeller Foundation for a survey of the position regarding the import of European periodicals. The results of the survey, reported to the Royal Society in August 1941, were regarded as justifying an approach to the Cabinet Advisory Committee on Science, chaired by Lord Hankey (for members see Appendix), to secure support for increased importation of such periodicals. The Committee decided that due to the severe restrictions on importation, additional imports could not be approved, but recommended that means should be sought to produce additional copies of those items already imported.

Sir Edward Appleton, Secretary of the Department of Scientific and Industrial Research (DSIR) was asked to consider the project, and joint meeting of representatives from government libraries, His Majesty's Stationery Office (HMSO), and DSIR, recommended the adoption of microfilming techniques. As neither of the latter organisations felt able to set up a microfilming service, Aslib was asked to consider the scheme. In January 1942 a Standing Advisory Committee (for members see Appendix) was appointed to investigate details of the projected microfilm scheme. An approach for funds was made to British industry, resulting in donations from a number of organisations (for donors see Appendix). The total sum received from this source over the period of operation was £2151 5s.

At the same time, University Microfilms Inc (UMI) was investigating the possibility of providing a document supply service to the USA, and it was agreed that AMS should supply both markets, with Mr Power of UMI acting as agent in the USA. With this initial agreement the inauguration of AMS was verified by Aslib Council on 6th May 1942, less than one year after the preliminary investigation had begun.

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The Royal Society guaranteed £200, and the Rockefeller Foundation initially allocated $7000 for microfilming equipment. The latter donation was later increased to a total of $10,000. Two Recordak Microfile Model D cameras were supplied, and AMS moved from its first headquarters at the Science Museum, and temporary accommodation at Imperial College, to the top floor of the office building of the Victoria and Albert Museum. AMS was situated at this address from 1st April 1943, and the accommodation was made available rent free for the duration of the war.

All periodicals, newspapers and other material scheduled for microfilming were collected daily by the US Marines from the appropriate holding departments. Three negatives were taken of all scientific and technical periodicals, two of which had a regular market in the USA. Production of the third negative was financed from the donations, and served as a master for supplying copies to research institutions in Great Britain and the Commonwealth. The time limit for microfilming was 48 hours for periodicals and 24 hours for newspapers. By the end of the first year 280 titles were being received regularly.

The slow development of the service was ascribed to prejudice against microfilm, a shortage of microfilm readers and the limitations on the promotion of the service. In an attempt to overcome the problems of non-usage, AMS started issuing classified contents lists of periodicals received. Until this stage, bibliographic control had been limited to an index of cards showing the holdings of any particular periodical, and another designed for cumulative records of a union catalogue type. Originally it had been intended that AMS would be concerned only with technical activities (and Aslib with the administration and bibliographic control), but the involvement of AMS in bibliographic control became of vital importance. Three different classification schemes were used, and 200 issues of the lists were produced. These series were deposited at the UK Copyright Libraries and at the Library of Congress. Although AMS also made considerable efforts to microfilm back issues of German periodicals (1939–41), lists of contents of these periodicals were not published.

Subscriptions were taken for sets of lists, or those in single subject areas. Many problems were encountered in the preparation of the lists, not the least being the time factor; it was easier to compile the contents lists from the hardcopy publications than from the microfilm, and the time available for this activity was limited. Also, the supply of the periodicals was severely affected by the national situation.

The scheme was dependent on mutual help, and many libraries which had their own techniques for obtaining material supplied the service. This co-operation extended to the USA, Sweden, Turkey and Portugal. Exchange of microfilms with documentation centres in France, Holland and Belgium was set up soon after the countries were liberated, and post-war co-operation was discussed. In conjunction with the British Council, AMS also undertook some microfilming of USSR periodicals, and a selection of Chinese papers printed in Western languages.

The experience that AMS was gaining was also used by other agencies [3,4] and by the end of the war it was microfilming confidential material for HM and US Governments, assisting the Publishers Association by microfilming out-of-print books, and microfilming manuscripts in British Libraries on behalf of the American Council for Learned Societies[5,6]. In addition AMS organised a conference and Brains Trust on the subject of copyright in 1945. The end of the war brought to AMS a complete cancellation of government contracts and a dramatic reduction in demand for war-time publications. Although there were thoughts that a document reproduction service could continue, these plans did not materialise and the AMS officially ceased operations at the end of 1945.

Negotiations between Aslib, the Royal Society of Medicine, the Royal Society, and the Rockefeller Foundation resulted in a new scheme funded by the latter organisation. Its aim was to provide assistance in the rehabilitation of medical libraries in liberated Europe. In February 1946, a conference of interested parties was held at the Royal Society of Medicine, and the Central Medical Library Bureau (CMLB) was founded. The cameras and readers of AMS were transferred to CMLB as soon as suitable accommodation was found. The transfer of the master negatives of scientific and technical periodicals was not fully agreed until June 1946. Under this agreement, Aslib was permitted access to the negatives for the duration of operation of CMLB.[7,8].

Aslib established a Documentary Reproduction Service for members and non-members;[9,10] initially the Service relied heavily on the AMS material. By 1978, when the Service was discontinued, most of the material was available through established interlending and photocopying services, and Aslib was operating as an agency rather than satisfying requests from the microfilm collection.

During the 1970's discussions took place between Aslib and representatives of the BLLD concerning the future of the collection of master negatives, which had been housed at, and moved with Aslib in the intervening years. Examination of the contents of the 1000+ tins of microfilm showed them to be in remarkably good condition. A preliminary study by BLLD on a section of contents revealed that some of the material was not yet held in its collection. In September 1982, this historic collection, together with the remaining indexes, was transferred to the BLLD.

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APPENDIX

Statistics

Total number of titles covered 526
Total number of available issues 14,000
Total number of pages photographed 1,000,000–1,500,000
Microfilm copies supplied to UK (monthly average) 10,918
Enlargements supplied to UK (monthly average) 563
Total number of microfilms handled 12,500,000

Cabinet Advisory Committee on Science

Representatives of the following organisations attended the Cabinet Advisory Committee on Science session requesting increased importation of scientific and technical periodicals:

Royal Society (RS)
Various Government Departments
Department of Scientific and Industrial Research (DSIR)
His Majesty's Stationery Office (HMSO)
Agricultural Research Council (ARC)
Medical Research Council (MRC)

Donations Received

(original names of organisations)
British Cast Iron Research Association
British Non-Ferrous Metals Research Association
Electrical and Musical Industries Ltd.

General Electric Co. Ltd.
High Duty Alloys Ltd.
Howard and Sons Ltd.
Imperial Chemical Industries Ltd. (annual subsidy)
Iron and Steel Industrial Council
Lever Bros. and Unilever Ltd.
London Transport and the four main railway companies
Lyons and Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Mond Nickel Co. Ltd.
Turner and Newell Ltd.

Total received from British industry: £2151 5s

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(* denotes member of Executive Committee)

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Research and the practitioner

Dissemination of research results within the library-information profession

Peter Lynam, Margaret Slater
and Rennie Walker

The potential market for the end product of research was explored within this project, using self-completed questionnaires. Practitioner attitudes towards and expectations of library-information research emerged with some clarity, so the published findings have not only interest value but also direct applicability to the researcher community.

The two-way communication gap between researcher and practitioner was emphasised by the study. Existence of this communication failure is already well-recognised by practitioner and researcher alike. One hopeful sign, however, was that in spite or because of this gap, practitioners actually wanted increased personal contact with researchers.

In terms of research topics, respondents exhibited an apparently healthy mix of interest in the applications of new and information technology within the field and concern for user needs and man-management. Closer analysis of findings revealed that it was only the sample as a whole that showed this balance. Technology was the prime concern of industrial-commercial practitioners, also of young professionals and new entrants to the field. The human angle and user and staff requirements were of greater interest to practitioners in academic units and public libraries, also to older and managerial level respondents in general.

The research process itself and the formal research report did not emerge unscathed from comparison with other professional activities and media. Detailed findings of this study have further implications for the conduct and presentation of research and for initial selection of research subjects.

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Aslib one-day seminar, London, 13 April 1983

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Types of application in private viewdata and their potential for the information/library field

Robin Yeates

Operations Manager, LASER

Paper presented at the Aslib Seminar 'Exploiting private viewdata', London, 13 April 1983

1. Introduction

IT IS DIFFICULT to isolate specific viewdata characteristics, and consideration of the potential of private viewdata systems in libraries and information services tends to sound very similar to consideration of applications of automation in general. This talk will try to highlight specific advantages of viewdata while not assuming that the technology has now reached its most advanced state. Viewdata is converging with conventional computing, but there remain key concepts of viewdata which may not be unique in themselves, but which have led to much interest. These concepts are: proliferation of low cost viewdata compatible terminals, use of menu selection, interactive facilities including message sending and ease of operation of the whole system in terms of file creation, user registration and user training. The potential for viewdata can be expressed by linking its various features with three application areas. These areas are:

(1) use within and between libraries for administration
(2) between libraries and outside agencies such as book suppliers for business applications
(3) contact between the library and its users, both local and remote (at home or in the office).

2. Application, classified by viewdata facility

(a) *Information retrieval and dissemination*

Ideal where suitable user terminals already exist, it may be practical to install them for this purpose. Thus Kingtel in Royal Borough of Kingston upon Thames provides a community directory to all its libraries, which have terminals for Prestel use. There are three types of application:

(i) access to existing external viewdata-compatible databases—several Euronet hosts, including ESA/IRS, Télésystèmes, DIMDI, and non-bibliographic services such as the Stock Exchange TOPIC system.

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(ii) creation of and access to inhouse viewdata files—perhaps via windows to existing computer files.

(iii) input of whole or part of the in-house files to public viewdata for wide dissemination—perhaps bulk-updating to Prestel of your services, prices, news.

The range of applications is very wide, and cost-effectiveness depends on individual cases, but a few examples can be suggested to give a general idea of the possibilities:

for *public libraries:* community information and news for public, local councillors and council staff; training information; job vacancies; delinquent user files; staff diaries and holiday schedules; facilities for local computer clubs; new book lists; information for staff on union activities.

for *business libraries:* company news; product comparisons; sales information summaries derived from larger computer files elsewhere; job vacancies; personnel specialisms and referral advice; abstracts of library holdings and details of library services; current contents lists; circulation lists for periodicals; information about working conditions for employees.

Certain special facilities, not yet available on Prestel, are available on some private systems. Dynamically redefinable character sets allow foreign alphabets, music and chemical notations to be displayed. TV picture quality can be achieved to transmit still pictures, perhaps stored on videodisk in future and indexed by a viewdata system: such systems could display new book covers, maps and diagrams, encyclopedic information for children and so on.

(b) *Mail order and data capture*

The response frame facility can be used for interlending (both interbranch and between branches and HQ), stationery orders, internal statistics gathering, staff diary compilation. Books or other supplies can be ordered. Library users can make book renewals, reservations, complaints, requests from within or outside the library. Bar-code readers can be linked to viewdata for data capture. Material can be collected, validated and passed to other computers cheaply from many sites.

(c) *Electronic mail and messaging*

Electronic messaging is possible between users and even between users and non-users via connections with other networks (e.g. the telex network). Messages can be in easily created standard formats or can be free format. These systems can be used for many kinds of messages between library branches and suppliers, and also to provide staff with an internal public mail system. They can also be used by users to send reference enquiries to the library or person identified by a file on the system as being the right specialist.

(d) *Computer Aided Learning*

Although some CAL applications may require additional workbooks, the colour display and the ease of setting up and amending sequences make viewdata ideal for many CAL situations, including teaching public or host organisation staff how to use the library and its facilities.

(e) *Visual aids*
The wide availability of cheap access to viewdata jack sockets and the existence of portable terminals, coupled with the colour display make viewdata useful for the preparation and use of aids for talks and presentations. Slides can easily be prepared using the viewdata editor for quick design and creation of frames which can be photographed.

(f) *Telesoftware*
If the users of your library have microcomputers with a suitable hardware/software interface, they can retrieve software from the viewdata system. This software can be just programs or can include data as well. The library could thus collect, index and re-distribute efficiently a wide range of software for users, reducing individual need for large amounts of disk storage and indexing effort.

(g) *Home working*
While a few key personnel may have a conventional computer terminal at home already, it is much more likely that a viewdata terminal will either already be in the home or could be purchased by the organisation for a member of staff's home use. All the services outlined above can therefore be made available no matter where the user is. The range of sophistication available in viewdata terminals makes the standard ideal for linking the home and business or official organisations.

3. Conclusions

It is worth remembering that one of the key attractions of viewdata is the ease by which it can be used directly by non-technical people. It is likely to become popular because it can be understood and because new applications depend more on users' imagination than on the skills of a few technical experts.

Librarians and information scientists now have the opportunity to become involved in a new communications and information medium. In the age of the User Friendly Interface traditional library skills can find a new outlet, not just within the library, but on the desk and in the homes of the users outside.

The TOPIC system at The Stock Exchange

Alan Currie

The Stock Exchange, London

Summary of paper given at a brief presentation at the Aslib seminar 'Exploiting private viewdata', London, 13 April 1983

Introduction

EVER SINCE THE South Sea Bubble when stocks were traded in Jonathan's Coffee House, there has been a need for the holder of a security to know its market value. From this he can determine his wealth, and made a judgment on the correct time to sell, hold or buy more.

From those early days until present times, the ownership of stocks and shares has increased from the small wealthy sector, to virtually every walk of life. Gone are the days when Stock Exchange prices in the *Times* would suffice the needs of investors; price information is needed throughout the day and it has to keep in step with world news. A coup or an earthquake in a far flung corner of the world could have sweeping consequences on one or more stock market.

These simple facts charge The Stock Exchange with the responsibility of providing up to the minute stock market information. From 1970 we have used a monchrome broadcast service of 22 pages to meet this requirement. Investors could only access this data in London, Birmingham, Manchester, Liverpool, Glasgow, Edinburgh and the Channel Islands.

Evaluation

When a replacement for this service was being evaluated, it had to fill certain criteria:

(1) There was the need for a far larger page capacity.
(2) Investors throughout the UK and Eire needed to access the service.
(3) The user should be able to find his way easily through a large system.
(4) When the data was found, to have an easy understanding.
(5) To be compatible with other systems.

Viewdata met these requirements:

(1) The only page constraint you would have would relate to how much computing power is used.

Aslib Proceedings, **35** (8) August 1983, p. 306–307. Printed in Great Britain.

(2) Geographical coverage over a British Telecom leased line will take you anywhere at a price.
(3) We developed a unique routing structure.
(4) The sensible use of colour gave an instantaneous picture of the market, at the moment of access.
(5) We made the system compatible with Prestel.

The addition of fast routing was essential. Price information has a very short life, over half the prices have a life of less than an hour. In hectic trading this can be reduced to seconds, time spent trying to find the correct data could prove expensive in the busy financial environment. This was also the reason for using colour, green for overnight price, red for falls and blue for stocks that have risen. This will give any user the picture in seconds. This system called TOPIC (Teletext Output of Price Information by Computer) was launched in June 1980.

Content

What information do we carry?

1500 of the most actively traded securities, indices, snapshots of the currency and commodities markets. Continuously updated trading information from the London Traded Options and the new Financial Futures market. Within the next few weeks we are to add further financial information, this will contain money rates, news, currency rates. This combination will give any investor in any part of the UK and Eire, a window to view the Financial Markets situation at any given moment.

The largest amount of data carried is provided by Information Providers in Closed User Groups. This data can only be viewed by the terminals that are designated by the owner of the Closed User Group. This area is mainly used by Stock Brokers sending up to the minute information to their clients. Security was a prime factor in the design of Closed User Groups, because of the confidential nature of their contents.

The future, possible future projects could be the capture of data from other markets in the United Kingdom and Overseas, and multipurpose terminals. I am sure we have only scratched the surface, but there is a message for all in this field: 'Keep it quick but keep it simple.'

Club 403—the DoI's test market for public residential viewdata service

Roy Grant

Department of Industry, London

Paper given at a brief presentation at the Aslib seminar 'Exploiting private viewdata', London, 13 April 1983

Introduction

CLUB 403 IS A RESIDENTIAL viewdata project based in Birmingham. It has come about as a result of the Television industry's desire to find out the acceptability of 'text on screen' in the home. Quite rightly, the decision was taken at the beginning of 1981 to plan a co-ordinated Industry approach to establish Teletext in the UK home market as a first stage development. With the Department of Industry acting as 'pump-primers' and co-ordinators Teletext penetration has moved in two years (until the end of 1982) from 100,000 placements to 750,000. That figure looks like being doubled during the course of 1983.

The importance attached to this successful Industry venture cannot be underestimated for two main reasons; First—it illustrates that Britain can market one of its inventions to its own people and thus provide a sound base for the marketing of Teletext beyond these shores, and second—it establishes the reality of 'text-on-screen' in the home.

Viewdata developments

Foreseeing the onset of mass market Teletext the TV Industry reached for the second stage, Prestel's Viewdata, and then proceeded to devise a series of strategies aimed at producing the second wave of consumer response.

The early Prestel problems, so succinctly analysed by Professor Scott Meynes, were addressed with vigour. Poor indexing and inconsistent procedures were seen to be due to a genuine lack of expertise and when combined with a 'jack of all trades' approach resulted only in a patchwork quilt database that was woefully short in both depth and breadth of content.

To counteract these shortfalls Viewtel Services was selected to manage a database that would be primarily residential and localised. Apart from Viewtel's proven track record as a major and sucessful information provider on Prestel, it had the distinct advantage of a publishing base, the *Birmingham Post and Mail*—an invaluable asset as a service for local information and

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services. Having selected a database manager based in Birmingham, it was logical that the residents of the second city become the guinea pigs.

Scott Meynes also identified cost as a major inhibiting factor to the early growth of Prestel in the residential market. To a degree, this was due to frustration with the product, but the initial basic hardware investment and the ongoing and largely open-ended proliferation of jackpoint installation costs, subscriptions, computer time and page charges and telephone line costs all stacked up to frighten off all but business users and ardent enthusiasts.

Given a reasonable mass market and developing technology the Television Industry calculated that within two to three years a hardware premium of between £80–£100 (or about £3 rental per month) above the price of a Teletext receiver could be viably charged for a TV receiver with full viewdata capability. It was therefore agreed that such a price should be charged from the outset of a residential viewdata project. This represented a considerable financial commitment by the Television Industry.

It was further agreed that Prestel's quarterly subscription plus computer time charges and page charges be wrapped up into one flat rate subscription. Other than telephone line charges, this would remove the open-endedness of the cost structure.

The Club 403 project

To counteract the 'chicken and egg' problem of the essential providers of information and services not wishing to support a system with few users, and, users not wishing to subscribe to a system that provided little in the way of information and services, a detailed and professional research programme was built into the first six months of the project.

The basic structure of the package had now been formulated. It was to be residential by design, Birmingham orientated, provided at an identifiable and reasonable cost and professionally researched.

The principle objectives of the test market had been established as follows:

- —To find out whether there is a significant market for residential viewdata services.
- —To find out what the consumer requires from such a service.
- —To find out what the consumer is prepared to pay for such a service, and
- —to stimulate industry, trade and consumer interest in the realities of such a proposition.

So the nine months of planning gave way in October last year to the recruitment of information and service providers, and the briefing of the TV Trade as to the role they must play in selling Club 403. After six months of the most intensive activity, Club 403 was launched in Birmingham on the 23rd of March. The hard work has only just begun.

Future Implications

I have no doubts that public viewdata will become the accepted 'first port of call' for information in the home. It will also play a vital role in how people go about selecting, buying and paying for goods and services.

The speed at which this revolution will take place depends entirely on the decisions we make now. The decisions I refer to particularly are as follows.

First, compatability. The Prestel public viewdata network, which by design uses a common system, has within it, despite considerable recent improvements, a morass of conflicting instructions which serve only to confuse our residential consumer. If the public face of viewdata can't get it right what is happening with private viewdata? When planning your private viewdata system don't be shortsighted and imagine that only you and your colleagues need know how you get from Page 1 to Page 2 and then back to Page 1 again. Some companies on Club 403 are already learning that lesson to their cost.

The second major decision, which is a corollary of compatability, is that of Common Carrier versus Private Viewdata. I am a firm believer that a typical residential consumer does not want to be issued with a telephone book of numbers that he has to first refer to, then reprogramme his auto-dialler on his viewdata receiver everytime he wants a different piece of information of make a transaction. The less buttons he has to push, the more acceptable he will find the system. Faced with a multiple of telephone numbers and a maze of differing instructions a residential consumer will certainly revert to using the telephone—but in a conventional manner.

Club 403 is therefore the first properly constituted market trial for residential viewdata. It represents the tip of the viewdata iceberg. If you ignore its implications the fate of the Titanic may well await you!

PVS-990 videotex information distribution and data entry system

Gavin Leslie

Mars Group Services, Slough

Summary of paper given at a brief presentation at the Aslib seminar 'Exploiting private viewdata', London, 13 April 1983

MARS INCORPORATED has been involved with viewdata systems since the early days of Prestel when we took part in the market trial of the public system. Our interest in the technology has always been motivated by the recognition of viewdata as a means to extend the power and scope of conventional data processing systems. The development of PVS-990 has concentrated on integrating viewdata (inexpensive, colour terminals and simple operating characteristics) with existing and new application systems.

The extensive facilities of PVS-990 emphasise the *easy* integration of viewdatabase and viewdata protocols with mainstream data processing systems whether on a shared processor or host computer. Advanced viewdata functions combine with comprehensive electronic mail capabilities to make this system extremely attractive to business and service institutions whose objective is to minimise the cost of introducing new users to computer usage, in both equipment and training, without restricting the power and scope of their application system.

As a commercial corporation, not a software house, our investment in this technology is not a speculative venture into a seemingly profitable new market place but a development driven by the real business needs of originally our sister companies and now also our customers. PVS-990 has been designed from the outset be an integrated part of a data processing strategy and such can be truly said to be 'built for business'.

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Designing a viewdata system

Peter Linton

Baric Computing Services, Feltham,
Middx.

Paper presented at the Aslib seminar 'Exploiting private viewdata', London, 13 April 1983

Analysing the information

THE FUNDAMENTAL UNIT in viewdata is the page, or single screenful of information. But it differs from a printed page in two important respects:

— it is much smaller—it can comfortably hold only about 100 words
— it is more sharply separated from its neighbours than a printed page.

This has important implications for design. Above all, a viewdata page needs to be considered as a self-contained unit.

Information to be put on viewdata therefore needs to be broken down as far as possible into page-sized chunks, each about the size of a short printed paragraph. This does not rule out running a paragraph over consecutive pages, but the clear break between pages when looking at viewdata makes it harder for the user to follow the drift.

This sub-division of the information is the first, vital task in designing a system. It may be useful to sketch out on a large sheet of paper the various categories and sub-categories, together with outline indexes.

Layout

Viewdata is a halfway house between computing and publishing. It has nothing in common with television, and nothing to learn from television presentation techniques; the most useful lessons for viewdata design come from printed magazines and brochures.

A typical magazine will have a brightly coloured front cover, to attract users; often with pointers to the contents. This is followed by a detailed index. The articles have bold titles, perhaps with graphics. The subsequent text is then plain print. This is a useful model for viewdata systems.

An individual page needs to have some sort of heading, to confirm to the user that he is where he expects to be; and a footing to indicate his next action. The text in between then needs to be laid out neatly, making full use of available space but not overcrowding the page. It is useful to use graphics such as thin lines, boxes, shapes etc. to separate different elements on the

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page and guide the user's eye. In many cases, the judicious use of a few such graphics will do much to improve a dull, poorly designed page.

Designing with colour

Colour is an essential ingredient in the appeal and acceptability of a viewdata system. For the designer, it is therefore all the more important to use colour sensitively and constructively.

There can be no hard and fast rules in such a subjective area, so here are some points to bear in mind:

— The seven available colours differ greatly in intensity:

White	100%
Yellow	89%
Cyan	70%
Green	59%
Magenta	41%
Red	30%
Blue	11%

As a general rule, white is too bright and garish for continuous use. Yellow, cyan and green are usually best for text.

— Colour should be used to highlight important information, and tone down less important.

— Colour can convey information in its own right, for example:

Profit and loss figures in cyan and red.
Members of Parliament identified by party colours.
Warnings etc. in red.
Key words or phrases can be picked out in a contrasting colour (equivalent to print techniques such as italics, underlining etc.).

— Consistent use of colour generates a sense of identity from page to page—an important element in 'house style'.

Viewdata page numbers

A viewdata system is structured like a multi-layered pyramid. The top is page 0, below it pages 1–9, then 10 to 99, down to the 9 or even the 11-digit level. Each number is said to 'own' the pages below it: thus page 99 owns all pages starting 99, e.g. 9904673. It does not own page 98 or 100.

Thus, unlike a book, page numbers go downwards—rather like Britain's road system. Driving down the A30, you expect to find the A303 and the B3084, not the A4 or A40. And, like the road system, the viewdata system subdivides into longer and longer numbers—each owned by a higher, or 'parent' page. Typically, the shorter page numbers are important starting points, often called 'nodes'. These are usually at the 3, 4 or 5 digit level.

Allocating page numbers

There are far more page numbers available than could ever be used—with a 9-digit limit, there are one billion numbers. With this degree of choice, there is no advantage in sticking to a narrow range of numbers—on the contrary, it is far better to spread out. There is a lot to be said for putting end pages well down the database (at the 8 or 9 digit level) with index pages higher up. The main considerations are:

(a) The structure should be simple and logical
(b) The system should be easy to maintain
(c) If possible, the numbers should be meaningful in their own right
(d) The structure should allow future expansion

Taking point (c), sales figures could be given page numbers ending in the week number, e.g. 77701, 77702 . . . 77752. This has two advantages:

(a) Users could easily go direct to those pages, without searching through the index
(b) Editors can maintain and update the pages more easily, for the same reason.

Where there are no obvious numbers to use, the simplest approach is to put together the number of an index page and the keying instruction. Thus for example if the Product Information Index is on 7771, and key 1 points to Product A, then the page number for Product A could be 77711. Product B would then be on 77712, etc. This is known as 'strict routing' because the page numbers and keying instructions all go hand in hand with the pyramid structure of viewdata itself, thus creating a simple, logical structure that is easy to maintain. This principle can be extended across a whole database.

In practice, it is not always possible to maintain such a degree of simplicity. One answer is to leave gaps between the layers. So instead of putting the Product Index on 7771, we put in on 77701.

Routing

A key point about viewdata is that it provides a ready-made mechanism for setting up a computer-based information system—without the need for any further programming. This mechanism is called 'routing', and provides a simple way of linking pages. It is achieved by setting up a list of numbers from 0 to 9, with blank spaces beside each into which the designer can insert page numbers.

This list is stored with its page, but hidden from the user. In effect, it is the back side of the page, and only available to the editor. When the user presses a number, for instance 2, the computer scans down the list, and fetches the page.

This mechanism lies at the heart of all viewdata systems. It is very simple, robust—and potentially very powerful. But it needs to be thought through carefully. The more thought the designer puts in, the easier life becomes for the user. Conversely a poorly worked out routing structure is counterproductive—it deters the user.

The single most complex task in viewdata design is to construct a routing framework to match the information. This is why it helps to analyse the information first, and subdivide it into manageable chunks. Then it becomes much simpler to map it on to the routing structure.

One common question is whether to take a 'top-down' or 'bottom-up' approach. The answer is normally—'both'. It is a good idea to start by sketching out the main index headings at the top of a large sheet of paper, and then the 'end pages', or actual information pages, along the bottom edge.

User friendly routing

At this stage, however, we need to ask: 'What else can we do to make the system simple and inviting to use?' It is the answer to that question that separates good viewdata design from bad.

The first improvement is to ensure that there is a route back to the indexes, using route 0. This should go back to a higher index, one that is a useful re-starting point. Thus from 7770111, route 0 could go back to the product info index on 77701, and from there to the main index 777.

The second improvement is to add a 'browsing' route—the ability to move on to an adjoining page after looking at what you want. Just as an encyclopaedia allows a reader to browse without referring back to the index, so should a viewdata system. We should let users see Product B after Product A, and so provide routes to allow that—for example, using key 8 to browse on. We could expand this by using key 7 to browse to the left, key 8 to the right. In general, it is a good principle to provide fairly sophisticated routing for experienced users—while making sure new users always have an easy option—e.g. key 0 to index.

Viewdata conventions

A number of conventions have grown up within viewdata, and these are strongly recommended because they make life much easier for the growing number of users who make use of a variety of databases on different viewdata systems:

- Key 0 back to a previous index. It is very important to provide users with options not just to go on down a pre-selected path, but to return to an index. It is now almost universal to use key 0 to return to an index. There is less agreement on whether this means an immediately preceding index, or the main index. In general, it is recommended to take the user back to a higher, significant index that provides a useful starting point. In general, every single frame in a system should have key 0, (though this may not always have to be shown—it may be enough to tell people early on that there is always a key 0).

- Key 1, 2, 3 etc. should take users further into the information.
- Key # should be used to take users to very closely related information, e.g. a continuation of the immediate frame.
- Browsing is important in viewdata—keys 7 and 8 are often used (but there are no strong conventions on this).
- Key 9 is often used to return the user to a preceding index, with key 0 to a higher, or main index. Other designers prefer to stick to key 0 for all indexes, even if repeated several times to return to the main index.
- It is fairly common to put a keying instruction before the topic, not after: 'Key 1 for Product Information'.
- Keying numbers are often in yellow to identify them as such. This means the user does not have to stop and think: if a number is in yellow, it is to be keyed; if not, to be read as part of the text.

Interactive viewdata

Interactive viewdata means a viewdata system connected to a special purpose computer program, that enables the user to send and receive data for processing by the computer immediately. In effect, it means holding a conversation with a computer, in which the computer reacts to the data it receives, and the data it sends back reflects the changes made as a result. One simple example is a computer program that records the availability of stock items in a warehouse. As one user orders items, the stock levels are reduced, and the next user sees the lower, revised levels.

Interactive viewdata is dynamic, in the sense that it can cope with continual change, whereas ordinary viewdata is static, relying on pages of information held in the computer. Another parallel distinction is that interactive viewdata does not hold the information on a page, but generates it as required, either totally under the control of the program or using partly blank pages or 'templates' into which the information is merged. This clearly places greater demands on the computer's resources than simply fetching a page and displaying it to the user. It also means that some of the facilities in the general purpose viewdata program are not used—for example, the routing mechanism. This is replaced by equivalent functions in the tailor-made program, with the advantage that the links between the various components in the system can be made much more specific to the purpose, more versatile (using letters as well as numbers) and allow more sophisticated facilities.

This distinction between interactive (dynamic) viewdata and ordinary (static) viewdata is fundamental. Essentially, it means there are two very different ways of constructing a system, and this enormously expands the scope and possibilities of viewdata.

A comparison highlights the differences:

Static	*Interactive*
Implemented by single general-purpose program that provides viewdata facilities	Based on tailor-made conventional computer program for specific purposes (e.g. stock control) in addition to general purpose view-data program.
Needs no programming effort	Computer staff needed to carry out systems analysis, program writing, technical back-up.
Database set up and amended from keyboard	Program entered on video terminal; accessed from viewdata sets, updated by either.
Consists of pages stored on computer discs	Consists of program held in computer memory, plus data files stored on disc, plus templates stored on disc.
No processing capability	Full processing capability of host computer
Considerable duplication in storage, e.g. of similar index pages: each page stored separately	Conventional computer storage: less duplication, more compact, therefore much cheaper storage.
Search by viewdata index only	Other search methods available; e.g. keyword.
Simple, cheap, but limited facilities	More complex, expensive, but more versatile.

A comparison of both types of viewdata shows:

- each has its pros and cons
- each needs to be matched to a suitable application—a question of 'horses for courses'
- In general, static viewdata is best for small, simple databases, or where certain information is seen by large numbers of people
- interactive viewdata is best for large, complex databases or where certain information must be updated frequently, or continually
- interactive viewdata is suited to systems with complex choices, different combinations and permutations of data, or needing selective security and privacy.

Summary

Viewdata is a new medium, and needs to be treated as such. It is not a good idea simply to transfer information from an existing medium whether print, video or computerised database on to a viewdata system. The material needs to be rethought and reworked in viewdata terms, taking account of the points above. The essence of viewdata is its simplicity, and appeal to people without computer skills. Achieving that is no problem. It is a good idea to look at what has been done on Prestel, pick up some useful lessons—and set to it at the keyboard.

Graphics and presentation: if this is the shape of things to come, why does it look nasty?

Ian McLaren
Lanchester Polytechnic, Coventry

Paper presented at the Aslib seminar 'Exploiting private viewdata', London, 13 April 1983

The graphic capability of present operational videotex systems is described. Enhancements which are likely to be incorporated into the second generation of equipment are outlined; and some applications are mentioned. Emphasis is placed upon the need for radical editorial reorganisation when transferring existing material to viewdata.

Introduction

THE ANSWER TO the question contained in the title is partly inherent in the design of the systems (i.e. the hardware); but equally in the way in which these systems are used. Let us look first at *the systems.*

At present the systems used principally in Europe belong to a class known as 'alpha-mosaic'. With these, the display is such that it is composed of a grid of 24 lines, each of which contains a maximum of 40 alphanumeric characters per line. These may each display, in place of an alphanumeric character, a smaller array of six (approximately) square cells. These in turn may display two of the seven colours available with the system. So far so good—*but* the design of the present character founts leaves much to be desired. Also, although the 5,760 graphic elements may seem generous, they are quite inadequate to render diagonal or curved lines. Despite this, many of the publishers involved with videotex make comparatively liberal use of the graphics facilities—all too frequently with unsightly consequences. This may be due in part to the fact that the majority of those concerned with the preparation of videotex material do not come from a graphic arts background—so when presented with a means by which they can create 'graphics' (of a sort) with comparative ease, they tend to use this facility indiscriminately. It is noticeable that when editorial or programming staff are familiar with the use of videotex editing equipment they tend to be far less inhibited in the creation of graphic material than one suspects they would be in the case of print.

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Turning to the non-European systems. These are tending to set the pace in the design of the second generation of videotex in Europe. Here the Canadian and Japanese systems, both of which have benefitted from considerable government funding, have developed a class of videotex system with far greater graphic fidelity. This type of system known as 'alpha-geometric', is in fact a medium resolution computer graphics system, capable of being transmitted by either television broadcasting, or telephone line. Being more sophisticated their introduction has been slower—but the lead established by the UK in introducing videotex in Britain is likely to be reduced as the North American systems become operational.

Technical initiatives

Interestingly the problem as to which system to opt for is being solved not at a national level (in terms of designated national or European standards); but by the equipment manufacturers independently. The delay in establishing international standards has probably forced this upon them. Several manufacturers offer equipment capable of operating both systems: and one can purchase such equipment for use as a private viewdata system. The firm which has the British licence for importing the Canadian technology has its origins in the advertising industry; perhaps this has been influential in generating a considerable interest in this equipment in the audio-visual market, where it is used as a method of generating slides. Similarly the British alpha-geometric system Cyclops, developed at the Open University—which closely matches the quality of the Canadian Telidon system—is being developed to operate on the BBC micro. When this is achieved, and in volume production, we may expect the images produced on home computers to be transformed dramatically. That is not to say that the public systems will remain as they are at present. Picture Prestel, demonstrated as long ago as 1979, has the ability to display a video quality image in a portion of the screen. When that is operational we may expect applications such as mail order, in the form of 'teleshopping', to really take off.

The BBC has made equally dramatic advances at a technical level. They have introduced a powerful computer graphics system, known as 'Flair'; which though designed as an enhancement version of teletext, is being sold now as a computer drawing system for conventional television use. The BBC Research Department is also to be congratulated for producing designs for electronically generated character founts which closely resemble graphic arts quality. This is a development of potentially dramatic significance for the appearance of videotex; if adopted it would have the effect for the end user of making teletext, and potentially viewdata also, resemble printed type rather than the graphically crude data processing character founts conventionally associated with line printers. Regrettably the manufacturers of domestic television sets are reluctant to introduce this capability in general purpose equipment. It is to be hoped that any private viewdata system which has a critical requirement for legibility, or where general appearance is critical, will not hesitate to consider adopting this initiative.

The present systems

Turning to the more immediately pressing subject of how to obtain the most graphically acceptable results from the present systems: one reason that much of the present material on British videotex is so unsightly is that only a minority of IPs appear to have given much thought to the editorial implications of this new medium. The videotex screen can only display a comparatively tiny amount of information at any time—but behind each 'page' of videotex there is a powerful computer with considerable storage capacity. The majority of IP's have tended to use the medium anachronistically. That is to say only a limited number utilise effectively the true potential of the computer to store and sift information, to assist the end user to obtain that information which he or she requires. This facility, unique to electronic publishing, has been labelled by the late Christopher Evans 'the dynamic book'. In *The Mighty Micro*[1] Evans alludes to 'the book of the 1980s (being) no longer passive, for it will be a sifter and interpreter as well as a purveyor of information. Dictionaries, to give the most simple example, will offer packages of relevant information on command. You type into the chip-reader a word or phrase describing the problem area and the computer will respond, probably with one or two questions probing the nature of your interest, and finally generating a balanced summary with background information. Many encyclopaedias and 'study' courses attempt to provide such guides at the moment but they are static, severely limited frameworks which rely on the user's motivation and basic research skills. The 'smart' encyclopaedias of the late '80s will *do their own research,* acting literally as study partners to anyone who needs to access any of the complex patterns of information contained within them.'

Videotex capabilities

While the present generation of videotex is a long way short of the sort of product envisaged by Evans it remains the nearest thing available to the domestic user; and private viewdata has the flexibility to resemble this more closely. In his excellent introduction to videotex Michael Aldrich[2] refers to the insensitive and unimaginative use of the medium by the data processing community (who tended to dominate initially the IPs). He suggests that they tended to perceive the screen as a 'picture of a printout', capable of displaying a mere 960 characters. Although this is an apparent limitation, it is so only if one is anticipating that videotex should mimic print. However, once one is attuned to the novel attributes of videotex and seeks out methods of presenting information in a manner suited to this medium, then one of the principal apparent constraints of the medium becomes a potentially benign characteristic. By using the peculiarities of the routing structure in such a way that an end page presents only that information which is genuine to a user's requirements, it is usually possible to filter out general information which is likely to overload the potential for a lucid visual presentation. Some examples may help to demonstrate this concept.

Take the case of public transport timetables. In print it is conventional to employ pictographic symbols to condense the detailed information when presenting a complete timetable for a specific route onto a single page. In France one has seen remarkably clever technical proposals which seek to imitate this convention on a videotex screen. A facility has been demonstrated which permits an alphanumeric character to display a representation of a pictogram—which may for example stand for 'buffet service'. Moreover multiple characters may be combined to display inconveniently shaped symbols; two characters may for example be employed to display a symbolic representation of a bed—to denote 'accommodation'; and three characters may be modified to display an approximation of the TEE logotype.. While these initiatives have a certain visual charm (perhaps attributable to their naivety); and undoubtedly demonstrate a technical competence; it must be said that they are fundamentally in this case a poor solution to a communication problem—because they attempt to ape a convention appropriate to a different medium[3]. In the case of print these symbols are necessary if one is to condense the information within the confines of the printed page. With videotex this does not necessarily apply. Here one has prodigous storage capacity 'behind' the display on the screen. This can be used to store more comprehensive information—always provided that one can devise a method of reconciling this volume of information with the miniscule capacity of a single videotex 'page'. If one can achieve this; then not only is it possible to describe particular services precisely in conventional written form—but it is also possible to dispense the information in a form which the user may readily comprehend. This process will be assisted if the data lists not all services which run between certain locations—but only those which may be required to make a particular journey (in a specified direction) on a particular day of the week, and at a specified time of the day. As an incidental benefit it is likely that this smaller span of information can be reconciled better with the graphic constraints of the present generation of videotex, by using space and colour to enhance readability and comprehension.

Once one has devised a suitable editorial framework, then it is usually the case that conventional typographic practice applies to the detailed design of videotex pages. A combination of upper and lower case characters tends to be more legible than text displayed exclusively in capitals. The inadequacies of videotex character founts make it more desirable than ever to find orderly and consistent arrangements of text; similarly the limited choice of founts in the case of videotex make the judicious use of spatial arrangement more imperative if one is to provide the reader with any sense of the relative emphasis of headings and subheadings. Videotex does have one advantage over print, namely the easy availability of colour. Aldrich[2] places considerable emphasis upon the effect of colour in making videotex a 'non threatening' medium. He suggests that 'for the first time, the universal use of colour and graphics provides a means of communicating meaning rather than displaying alphanumerics'. And later, commenting upon the need for a creative contribution to the design of videotex material, he says: 'Sadly, these talents are not to be found generally in the data processing community ... colour demands imagination. In highly procedural data processing systems, imagination, in the past, has been directed at technical aspects of the system—the elegance and resilience of the programs; the neat tricks to tune performance; the clever use of disk access techniques and the like. Today, as we move from data processing to information processing, it is more important to build a persona for the system that makes it more acceptable to a wider audience, even the general public ... Colour and graphics provide the opportunities. To be informative without being boring; to be relevant without being curt ... these are the challenges that face the systems designer. The tools are powerful, but they can be easily misused'. The other attribute peculiar to videotex is the flash facility. The novelty of this particular feature has more often than not gone to editors' heads and tends to be used with horrid abandon. The flash facility can in fact be used to create an illusion of animation; where this is used successfully it is probably one of the most witty, and potentially most penetrating, ways of employing videotex.

Conclusion

The present generation of videotex is graphically crude; and there remains considerable confusion as to the precise capabilities of the second generation systems. Although some second generation systems have demonstrated high resolution and video quality graphics, it is probable that a medium resolution alpha-geometric 'paint' system with still video and improved fount design is likely to be implemented.

When seeking to optimise the use of the present systems it is likely that the greatest benefit to the end user will be obtained by examining the user's requirements with a fresh eye; with a view to 'dispensing' only that information which is truly relevant to the user's anticipated enquiry. This will probably require a markedly different editorial structure than that customary in printed form.

Once the information is structured to suit the user's likely needs it is probable that the removal of inessential text and images will permit the designer to concentrate upon preparing a readable presentation. By selecting a 'quiet' colour for the main body of the text one can then employ brighter colours for the various degrees of heading and subheading required by the text. Once a general typographic style has been established one can consider what scope remains for introducing supplementary graphic imagery to elucidate or personalise the subject. Although the scope is at present limited by technical constraints, considerable potential remains for introducing simple logotypes, and elementary diagrammatic and other forms of pictorial imagery. In addition to supplementing the informative value of the service, the potential for introducing an element of pictorial humour can also serve, when used with discretion, to 'humanise' the service and to achieve a user friendly product.

The management of viewdata

Robin Clough

ICI, Agricultural Division, Billingham

Paper presented at the Aslib seminar 'Exploiting private viewdata', London, 13 April 1983

Introduction

PRIVATE VIEWDATA SYSTEMS in themselves may not be brand new technology—their serious application to business needs, however, certainly offers a brand new approach.

To offer thoughts on their management at this early stage of the proceedings would be seen at worst to be arrogance and at best to be hasty. However, even with the limited experience that has been gained to date, it is possible to distil out some clear messages from which those about to participate would benefit. One very clear message is that Viewdata, properly harnessed can be of very considerable benefit to the organisations which adopt it and the ratio of effort to reward is very favourable. Those of us who are actively using it appreciate that nothing but benefit can accrue from a steady growth in our numbers.

Since my role encompasses the managing of Viewdata for my company as a whole, I could have written these thoughts from that wider perspective. However, I judged that few organisations contemplating its use would be of that size, and the size certainly introduces complexities all of its own. I shall, therefore be offering thoughts more applicable to one of our divisions e.g. a large manufacturing company employing, lets say, perhaps 1,000 professional/managerial staff. In putting my thoughts together I have had the assistance of my colleagues who manage Viewdata at that level.

Viewdata defined

If it is arrogant at this stage to attempt to elucidate principles for managing Viewdata, then it is certainly cheeky to attempt to define it. Just because there are many possible definitions, indeed, practical realisations of the concept, it is necessary that I should attempt to define what I have in my mind when I use the word Viewdata.

Most people have encountered the British Telecom offering 'Prestel' and are familiar with its simple menu-driven tree-structured approach to finding useful items of data. If we add to this an ability to enter the data, arrange the menus and construct the tree-structure, all from a terminal, then we have the essence of Viewdata. However, people exploiting this approach privately,

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very quickly realise that a good deal of the data that they wish to view is actually drawn from other computer services. Mechanisms to allow this to happen have been devised and are being marketed. The person searching for data still sees the same menu/tree-structured approach, it is the way in which the data, the structure and the menu were input that makes the difference.

'Prestel' were quick to spot that the medium could offer the possibility for people viewing the data to make some response to it. For example, when reviewing a catalogue they might wish to place an order. Response frames, which are really a form of data collection, are a normal feature of private Viewdata systems.

Again, 'Prestel' thought in terms of their customers being able to pass messages on a 'store and call forward' basis between themselves. Many private Viewdata systems are certainly equipped with such a facility and indeed usually offer it with many enhancements beyond the existing 'Prestel' services in the area of messaging.

How are all of these services provided? In the model that I am considering almost certainly by a mini computer with a disk drive for the immediate access of the data, and a tape drive to permit back-up and data transfer. The mini computer is likely to be addressed via a telephone hunting group and modems from Videotex terminals via ordinary dial-up telephone connections.

The Videotex terminal is likely to be an adapted television set.

Resources required

By looking at the various resources which are required I shall identify the main issues in managing Viewdata.

Let us look first at the computer upon which this service is to be built. *My first, and very firm recommendation,* is that you must be able to purchase it as a total 'turn-key' operation. You must be able to install Viewdata without involving any of your technical experts e.g. systems programmers. If you do not have a single supplier responsible for the hardware and the software, you will have to involve such people, if and when it goes wrong. This is not to say that you should only go to suppliers that themselves manufacture all components. This ideal situation does exist, but no worse a deal is offered by a manufacturer of, say, software who undertakes to be totally responsible for the complete installed kit. In practice they may choose to have the maintenance done on the hardware by the people who originally manufactured it, but there is nothing wrong in this providing that you as a customer never find yourself in a three cornered fight.

Beyond this prime consideration it is clearly important that you set out, if only in laymen's terms, the expectations that you have of the equipment and ask for an undertaking from the supplier that they will be met. I have in mind here such things as connectability to other mainframe computers, response times, number of concurrent users, size of database.

When it comes to the choice of such equipment, and the offerings are legion, hang on to one thought. Presumably a prime motivation in going Viewdata is to achieve something rapidly. A full scale research project to work out which of twenty-odd available systems is the best can hardly be the finest way to realise the required result. Several excellent reports which review the market place have already been produced and you could do a lot worse than consult them for a quick way forward.

A private Viewdata system which would allow several hundred users access (not simultaneously) possibly costs of the order of £50–100,000. A Videotex terminal can cost up to £1,000. Elementary arithmetic soon highlights which is likely to be the biggest spend. *The second major recommendation* then is rapid control over the purchase of terminals and the securing of sensible discounts for the quantities which you propose buying. *The third major recommendation* is don't buy them. Terminal technology and indeed Viewdata technology is moving so quickly that purchase, unless exceptionally favourable terms are offered, will simply commit you to a standard of the technology which has become outdated long before the equipment has been written off. Get the best possible price on rental for the terminals which you believe to have the best modems.

The early assumption that communication will comprise some form of switched voice line may not be valid for those applications which are mainly concerned with people working on a given site. However, if Viewdata is used for communication within a sales force, for example, then communication via the public switched telephone network (PSTN) will be necessary, and undoubtedly will produce its own crop of problems which have to be managed. Solutions vary from optimising the existing arrangement, to accepting that some form of network reducing the PSTN connection to the minimum is the only way forward.

The last sub-item when considering resources concerns people.

Recommendation 4 is that the organisation must appoint a single person to manage its viewdata activity. *Recommendation 5* is that so far as the person who has been appointed to manage the activity can achieve it, the individual users who feel local need for Viewdata type services should be encouraged to think that they are acting for themselves, both in terms of putting the data together and, of course, making use of it. Viewdata is not something which is going to benefit from central management or, worse still, control. It is a user's medium—possibly the first centralised computing function that has been so designed. If it is successfully applied then the sheer increase in the number of users and the multiplicity of applications being tried would overwhelm a single person trying to control it centrally. As witness to that, on the site where I work an initial population of 25 users became in a few months just under 200 and that number still growing rapidly. Within this population the person in overall charge is hoping to see some 'information providers' who are actually concerned with the day to day work of servicing the applications.

Recommendation 6—In addition to the person in overall charge and the users it is highly desirable that the day to day control of the activity within the system is in the hands of a 'System Controller'. This person will be concerned with the access of authorised users to the system i.e. issuing passwords, registration particulars, giving guidance to the construction of the database (see later), and possibly giving a first line level of support.

This whole question of first line support needs exploring in some detail. Viewdata is a relatively simple technology, and its users quickly become aware of the way in which, if at all, it malfunctions. However, from time to time, there will be situations where they are uncertain as to why they are not getting the results they require. The endeavour should be to give them one telephone number which they can contact to obtain that first level of help. Manning this service needs careful consideration. Is it, for example, to be available just for office hours?—not in itself very useful if many of the users are in a sales force and only return home to their Videotex sets in the evenings.

Lastly under this heading on resources one should not overlook the need for traditional data processing skills particularly if data is to be transferred from other machines. This data, unfortunately, is very unlikely to reside on those other machines in a form which makes that transfer painless.

There is also the possibility, a very real one, that you will wish to enhance your Viewdata service by writing special applications (most private systems allow for this). If you do there is an issue as to whether you wish to provide your own internal resource for doing this or merely specify and purchase the solution probably from the supplier of your original private Viewdata system.

Finally, *Recommendation 7:* one of the main advantages of Viewdata is that it can give solutions very rapidly. Under-resourcing any aspect can considerably detract from that major advantage. It is relatively cheap to give over-capacity on the machines. As far as the development of special systems is concerned, if internal resources are scarce then arrangements should be made to purchase them rapidly and effectively from the outside world.

The database

The debt to 'Prestel' is enormous. Almost alone they thought of Viewdata and promoted the concepts. For several years in the teeth of gales of disparaging noise they pressed on. Today, possibly to their surprise, Viewdata is taking off mainly in the area of private Viewdata systems. It seems churlish against this background to suggest that the best grim warning on the construction of a Viewdata base is offered by 'Prestel' itself. However, that is probably an inevitability and stems as much from the legal restraints on the Post and Telecommunications authority as from any lack of competence of their staff to see a better way to do things.

You will be aware from discussion in the press that many people have queried whether it would be proper for an organisation like British Telecom to examine critically data that was put to it for publishing on 'Prestel'. Apart from a duty at law to reject the pornographic, they are almost precluded from making judgements on quality or suitability of material which companies acting as information providers put to them.

Recommendation 8: Viewdata may well contain a large number of individual databases, but its overall value to the organisation using it will be considerably reduced unless these are handled in a way which widens their access to all those that would find them useful. To take a very simple example, it may happen that somebody in a Treasurer's Department puts up foreign exchange rates for currency. People in sales and many other departments might like to see those figures. They should be made widely available. If they are there are problems of indexing, control on the validity of the data, and keeping that data up to date.

How best to manage that is an issue upon which there can only be conjecture. To the present time, and I have seen a number of private Viewdata applications, I have no belief that anyone has found a generalised effective way of doing this.

The aim has got to be to allow the local information providers to believe that they control their own destiny—this is one of the proven attractions of Viewdata. The person managing the system overall has got to find ways of persuading those people to take on the responsibility to ensure that their data is good enough for general public access where it has wide interest.

To examine the major problem, that of 'indexing' the data so that it can be readily found by those who only half suspect its existence we have discovered that it is necessary to negotiate with each information provider that he adopts a standard top 2/3 levels within the tree-structures which he creates. Clearly as the volume of information and its disparity grows there is pressure to produce some general form of index. I can believe in content lists, but have difficulty in swallowing the application of the buzz word 'key word systems' to the Viewdata environment. This is not to say that key word based information retrieval systems could not be given the simplicity of the Viewdata approach—far from it. We shall be offering within the next release of 'ASSASSIN' (due to be launched in the middle of this year) features which have just this desirable approach.

What I do take exception to is the development of key word systems from scratch by people who have never previously worked in that area of text retrieval. Excellent systems already exist and some sort of marriage between these systems and Viewdata would seem more appropriate.

Commitment

Viewdata gains commitment where it takes on and performs a function which simply would not be provisioned as easily or cheaply in any other way.

It is not surprising that some of the main uses of Viewdata involve linking travel bureaux to travel companies; car dealers to manufacturers; and sales forces working in the field to their management. All these applications contain the elements of it being desperately important that little or no training has to be given, as the population using them is too large and too widely spread for this to be economical, and the use of cheap terminals by simple communications method to the central computer is more feasible.

One also discovers in a wide range of private systems that Viewdata is simply being used as a publishing tool—another way of getting data processed information to its ultimate client. In this guise it is no more nor less a combination of the line printer/photocopier and mail service and a very cheap and effective one at that.

This is not to say that one does not need to promote the concept within one's organisation. *Recommendation 9* is that in promoting it one should seek not only to use Viewdata as the visual aid which helps you to tell the story, but also to do your best to show real examples where Viewdata is directly helping and effecting the business in which it is being involved. There are now plenty of these, and the suppliers of private systems will be able to point you to them and indeed make them available for you to show your own management.

Viewdata's attractions

Let me close by setting out key reasons why Viewdata is attractive.

It is one of the first computer systems built for end users, who are not computer specialists, both to enter and access their own data. In order to achieve this it is recognised that non-expert systems are usually menu driven, and if there is a command language it should be very simple.

Because of the excellent lead given by British Telecom the command language is not only very simple, but it is also very standard.

All this leads to Viewdata being one of the very few information technologies that can be installed without commitment to an extensive training programme for the people that are going to use it.

In addition to there being no training of the users it would be perfectly feasible to purchase a 'turn-key' application and install it with no reference to existing computing/data processing staff.

Progress to some useful final goal can for all these reasons be extremely rapid. It could be installed, for example, to transfer key information relating to sales activity currently resident on the mainframe to the field sales force, and to allow that field sales force to communicate between themselves and their management, such an application to be commissioned and in place inside a very small number of months. We proved it.

It is a fantastic opportunity to revolutionise our organisations' attitude to computing. All of this could go sour if the project were not properly managed, perhaps along the lines suggested.

Proceedings of a
Conference of the
Aslib Biological and
Agricultural
Sciences Group

JUNE 1982

COMPUTERISED SYSTEMS IN LIBRARY AND INFORMATION SERVICES

Editor:
H L Williams

Few institutions have been able to afford mainframe computers specifically to run their internal library or information services, but some have been able to run in-house services using spare capacity on mainframe installed for other purposes, and the advent of the microprocessor has allowed the development of small but powerful computer systems which many information managers can afford. The availability of these new computer systems has stimulated the development of many software packages which are particularly suitable for use by small libraries and information units. Agricultural and biological libraries and information services are no exception to these trends, but Aslib Biological and Agricultural Sciences Group recognised that there were many small library and information units in the UK which were under-informed about current thinking and developments relating to these new systems. This Conference set out to try and reduce this problem by highlighting the experiences of established users of mainframe and microcomputer technology.

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Research and the practitioner

Dissemination of research results within the library-information profession

Peter Lynam, Margaret Slater and Rennie Walker

The potential market for the end product of research was explored within this project, using self-completed questionnaires. Practitioner attitudes towards and expectations of library-information research emerged with some clarity, so the published findings have not only interest value but also direct applicability to the researcher community.

The two-way communication gap between researcher and practitioner was emphasised by the study. Existence of this communication failure is already well-recognised by practitioner and researcher alike. One hopeful sign, however, was that in spite or because of this gap, practitioners actually wanted increased personal contact with researchers.

In terms of research topics, respondents exhibited an apparently healthy mix of interest in the applications of new and information technology within the field and concern for user needs and man-management. Closer analysis of findings revealed that it was only the sample as a whole that showed this balance. Technology was the prime concern of industrial-commercial practitioners, also of young professionals and new entrants to the field. The human angle and user and staff requirements were of greater interest to practitioners in academic units and public libraries, also to older and managerial level respondents in general.

The research process itself and the formal research report did not emerge unscathed from comparison with other professional activities and media. Detailed findings of this study have further implications for the conduct and presentation of research and for initial selection of research subjects.

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Library and Information Networks in Western Europe

Jack Burkett

There are so many different kinds of organisation — national, regional, and international — active in every subject field and creating a vast amount of new and modified information, that a need exists for guidance in the face of this complexity. Even within some large international organisations, particularly those which have their component divisions geographically scattered, not everything is known by the employee about the body within which he or she works. It was to satisfy this need that the author prepared the present survey, following the style of his earlier publication *Library and Information Networks in the United Kingdom* (Aslib, 1979).

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ASLIB PROCEEDINGS

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Aslib Proceedings carries papers given at Aslib meetings and conferences, and contributed papers of interest to practising professionals. These describe innovations in information management techniques, applications of existing information products and services, and case studies of information units and special libraries. The contents of the journal are reviewed by an editorial board.

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Software off the shelf: in-house information with a micro

Paul Burton
Chief Librarian, Leith Nautical College

Paper presented at the Aslib Northern and Midlands Branches Joint Annual Conference, 'Access to information—towards 1984', Kendal, 17–19 March 1983

Introduction

The subject of this paper is two-fold, in that I have been asked to consider the availability *and* the practical use of software packages for information retrieval with a microcomputer. From the outset, it can be said that the microcomputer is capable of handling many aspects of library work, not least information retrieval.[1] This is particularly true now that most of the earlier constraints on memory and storage capacity have been overcome. The widespread availability of hard disks capable of storing up to 100 million characters, and the advent of the faster and more powerful 16-bit systems have already brought the microcomputer to a point where it can rival some minicomputer systems: promised technical developments suggest that this progress will continue in the forseeable future.

Microcomputers are currently being used, as I have already said, for many areas of library and information work, including the retrieval of both bibliographic and non-bibliographic data, current awareness and selective dissemination of information (SDI). In most cases, this is being carried out with commercial software, though it should be said that a number of librarians have written or have commissioned programs for their own specific applications.[2–4] Because such in-house software is not always widely available and because it is usually specific to one library, I shall concentrate on commercially available programs, but I would not like it to be thought that I am totally ignoring the sterling efforts of these individuals!

I should also mention in passing the use of microcomputers as aids to online searching of commercial databases. Various software/hardware combinations exist for this, and reports suggest that considerable savings in both time and money can be made.[5–7]

Database management systems (DBMS)

One type of program most suited to the information retrieval work of the library world is the database management system (DBMS). It has to be said

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that these are rarely the DBMS of the minicomputer or mainframe: they are more accurately termed file-handlers or file-management systems, though there are some which have true DBMS facilities (a program called, confusingly, MDBS is an example).[8]

There is a DBMS for practically every make of microcomputer, each with varying capabilities. I find it is usually possible to draw analogies with motoring and in those terms, it is possible to select from a range which runs from the Mini to the Rolls Royce and, just as with the current range of cars, there is a DBMS 'model' to suit most requirements. (It is, incidentally, part of the established wisdom that the application determines the software, which in turn determines the hardware required. Looked at that way, the choice can indeed be wide, but we must also be realistic and acknowledge the fact that, in many cases, librarians are faced with little or no choice of hardware (because of institutional policy, for example), in which case the choice of software and what can be done with it will be more limited).

Continuing the motoring analogy, the price range of DBMS is similarly wide: most are in the £50–1,000 bracket, though there are a few at the Rolls Royce end and some at very low prices. While it is generally true that 'you get what you pay for', all have some features in common, and just as with a car, it becomes a question of selecting a program which fits your requirements and your finance—and it would be naïve to pretend that cost was not a significant factor.

This means, therefore, that the prospective user should first of all have a clear idea of the library's needs.[9–11] The following points should be clearly stated from the outset:

Which files are to be automated?
How large are they in total?
How much are they likely to grow?
What kind of records will be stored?
  (Bibliographic/non-bibliographic)
What information will each record contain?
What information will be sought from the file?
How will it be presented, and to whom? (Library staff/end-user?)
Are there any features which would be useful but not vital?
Who will use the system regularly?
What level of experience can be expected of users?

All of these should be clearly stated from the outset and, as I have already suggested, another question will inevitably be 'How much can we afford to pay?' Finally, do not discount the possibility that some files may be best left as they are, with manual operation: automation is not always the best answer.

Once the requirements of the system are known, it is possible to start looking at software and to match available programs to requirements, subject to other, more quantitative, criteria which I shall discuss in a moment.

DBMS software allows the user to devise, on the screen, a format for each type of record in the same way that a 5×3 or 6×4 card might be laid out. This format will specify the lines (or fields) in a record, their length in terms of number of characters, and the location of each field within the record. Most DBMS use fixed-length fields, though there are some which will allow a record to contain variable length fields, which are particularly useful for free text, such as an abstract. It is normally possible to call a field by any suitable name: the format is entirely at the user's discretion, though there are one or two programs (mainly originating in the USA) which contain 'built-in fields' for such data as zip codes. It is, however, known that these have caused few problems for British users.

Program limitations

More important are the limitations posed by either the program or the hardware and it is these which have to be matched to the requirements which have already been determined.

One major factor is the maximum size of record which can be stored on the database. The available programs vary in being able to handle records of up to 2,000-plus characters, though some will permit larger records. The user can set up records of different sizes up to the maximum, though usually all records in one file must be of the same size. It will therefore be necessary to estimate the size of the largest record in the system (bearing in mind that these maxima include spaces and punctuation): 250 characters would be sufficient, I believe, to hold a bibliographic record for a book or an article, though in the latter case it would be necessary to use index terms or keywords rather than an abstract. 1,000 characters or more would allow a short abstract or possibly some free text. I doubt if many information retrieval functions could be carried out with less than 250 characters, though some 'housekeeping' routines might not need as much space.

Closely related to the maximum size of record is the maximum number of records which can be stored per disk—and I shall consider the floppy disk here, since with hard disks capable of storing 3 million to over 100 million characters, the storage capacity becomes less of a consideration.

Record storage is basically a function of record size, and it is possible to estimate the total number of records which can be stored on one disk by dividing the disk capacity by the size of the record. Depending on the disk and microcomputer system, disks have a capacity of between 100,000 and slightly more than 1 million characters, so they can store between 400 and 4,000 records of 250 characters (the maximum will, in fact, be slightly less, because there are various overheads required by the system).

It will be obvious from these figures that, using floppy disks, the size of the file becomes a major factor. Large files may have to be spread over two or more disks, with all the attendant problems of disk swapping, file division and so on.[12] On the other hand, small files will fit comfortably onto one disk, and it may be possible to use the maximum record size available to include more data (providing that it is relevant!).

Most programs limit the number of lines or fields which a record can contain: this can vary considerably, though it tends to be higher with the larger record sizes. However, fields can be repeated as required, so it is possible to have 3 author fields, for example. Maximum field lengths may also be stipulated and these too seem to vary between the available programs.

Clearly, for information retrieval of any sort it will be necessary to search a file for records which match the question posed, and consideration must be given to the search capabilities of programs under consideration.

How many search criteria can be included at one time? Some programs will only allow four or five, some go as high as 50. If numbers are limited, is it possible to set up sub-sets of the file which can be searched with further terms? There may be limitations on how search terms are applied, e.g. it may not be possible to search on different types of field, such as alphabetical and date, simultaneously. It will also be necessary to establish which operators can be used to link search terms—the usual ones are the Boolean operators: AND, OR, NOT, but many programs will also offer qualifiers such as 'greater than', 'less than', 'equal to', and so on. It may even be possible to stipulate the position of a required character in the field.

A highly desirable feature is the ability to stringsearch, i.e. to find every occurence of a given set of characters (which may not be a complete term). The program we are using at Leith has this facility, which we can use as the equivalent of truncation: we can search for the characters FUEL and find FUEL ADDITIVES, FUEL CONSUMPTION and FUELS.[13] Bear in mind also that search times may not be very fast, particularly if the whole file has to be scanned and the results are to be printed out. Printing tends to slow down output simply because printers cannot operate at the same speed as the computer. The answer is either to use the fastest possible printer that you can afford (and then get on with something else) or to use a printer buffer which takes all the data from the computer and feeds it through at a rate acceptable to the printer, thus leaving the computer free for the next task. A program should be able to find a single record by its key within a second or two at the very most: any longer will make record amendment (or simple viewing) a tedious and time consuming task.

At this point, I would like to return to my motoring analogy. If the library's requirements have been specified from the start, these will indicate the search facilities which are needed: there is no need to buy the 3-litre model when 1300cc will do! The minimum necessary will no doubt be the Boolean operators (AND, OR, NOT): 'greater than', and 'less than' are very useful, particularly if searching for dates or numeric values. It is a little difficult to suggest a useful maximum number of search criteria, since this will vary with the files used: 10 would allow an acceptable degree of detail in a search of a bibliographic database.

DBMS software invariably offers the ability to sort a file alphanumerically, so that the output, be it on the screen or printed, is in a useful order. Some, however, also allow levels of sorting, i.e. the output can be sub-arranged by another field. Thus, in a file arranged by class number, entries under one number could be sub-arranged by author; an author listing could also be sorted by title, and so on. It is also worth investigating the 'depth' to which sorting is possible. By this I mean the number of characters in a field which the program uses to sort the file. It becomes important when a number of records have, say, the first 10 or 15 characters in common, a situation which could occur in a classified file.

Unlike the well-established library applications of mainframe and minicomputers, microcomputers have still to be informed about library filing rules. Figure 1 shows a sample from a sorted file and it indicates the inability of the program to file 'Mac' and 'Mc' as a library would require, as well as the effect of initials with and without stops. It is unlikely that you will be able to change this feature, but it should be possible to develop policies about data entry which will cope with the problem. (The example, incidentally, is a contrived one, but nevertheless genuine!)

H.S.E.	Guidance note GS.19
Hahn, F.	Money and inflation
Hardiman, M.	The social dimensions of development
Harrison, R.	Lead pollution
Henderson, G.	Directory of British associations
Holland, R.	Advanced 6502 programming
Hooft, J.	Advanced dynamics of marine structures
Hughes	The storage and handling of petroleum
HMSO	Harbours (Scotland) Act 1982
HMSO	Britain 1983
(	
(	
(	
MacGregor, W.	Microprocessors
Maddison, J.	Education in the microelectronics era
Malvino, A.	Digital computer electronics
Markham, W. E.	Ice atlas
Mayne, A.	Database management systems
McAllister, J.	Digital techniques for technicians
McCulloch, J.	Money and inflation
McGregor, J.	The BBC microbook
McMullan, T.	Energy resources
Meade, R.	Wage-fixing

FIG. 1. *Sample from a sorted file*

Print facilities

Having established various files on disk, you will almost certainly want to print out records or indeed entire files—despite assurances about the imminence of the paperless society! The next point to consider therefore is the printing capability: what print formats does the program offer? Three possibilities are usually available and all three might be considered desirable in a library context.

A record can obviously be printed out in its entirety, exactly as it is recorded on disk. Often it is also possible to print a number of selected lines (fields) in any order, and to stipulate that each entry be printed two, three or more times, usually in columns across the page. This is called the 'label format', as it is (surprisingly enough) often used to print address labels, though it has advantages for libraries. I know of one audiovisual librarian who uses this facility to print unit entries, to which additional authors, class numbers, etc. can be added. Many programs offer in addition a fully tailored format, in which fields can be printed in any order. It differs from the label format in allowing the re-arrangement of all fields in a record, and in allowing the addition of page numbering, page headings, underlining, free text, and so on.

'Optional extras'

I suggested earlier that there were also some features which it would be nice to have, but which may not be essential (rather like some optional extras available for cars).

Many DBMS programs offer a mathematics facility (often of great range) which may not have obvious applications in bibliographic information retrieval but could conceivably be of use in a databank. Some other desirable features include the ability to find a particular record when only part of a field is known. This is a feature which we can also use as the equivalent of the 'NBR' command on BLAISE. In addition, the ability to change a record format and convert all existing records to that new format is particularly valuable if (when!), after some experience, you change your mind about the way a file is used. For current awareness and SDI work it is obviously useful to be able to store regularly-used search strategies to run against an updated database. Stored searches could be staff profiles, for example, which can be used to provide regular listings of new material. Alternatively, they can be used to produce current lists or bibliographies.

I would also include in the 'desirable' category some program utilities (disk back-up, directory view, file deletion, etc.) simply because it makes life so much easier. The ability to make back-up copies and so on without going 'outside' the program is a valuable timesaver.

One major problem with microcomputer software has been its lack of integration, i.e. the various programs available for, let us say, information retrieval, word processing and finance have been discrete packages which operated with their own data files and without links to one another, even though they may have come from the same supplier. This is now changing, and a number of DBMS can be linked with word processing software from the same family, with the result that even greater editing facilities are available for the output from searches. (A British Library R and D Department research project is currently investigating this question).

Ease of use

If a DBMS package is more difficult to use than the original system, then it will not be used, or it will be used badly (which may be worse!)

The staff who will be affected by the new system should be involved in all stages of its implementation, so that they can advise on its use and can be aware of what it will mean to their work. If this is not done, there is always the danger that staff feel threatened by the new technology, with consequent effects on morale and performance. Naturally, training (which may be offered by the software supplier) should be as thorough as possible and be carried out in the library rather than on the supplier's premises: in this way, staff can see immediately the relevance and the impact of the new techniques.

There are a number of factors which go towards making a program easy to use. It should be possible for the program to trap data entry errors without 'crashing' and to warn the operator that he/she has tried to enter data of the wrong type. Some systems will crash, but do warn the user of which errors will bring this about. It is useful if data entered before a crash can be recovered easily, though this is another good reason to make back-up copies at regular intervals.

The security of data may be an important factor in some situations. A DBMS program could be used, for example, to run a 'public' index to report literature, in which case end-users should be prevented from making their own amendments to records, or from adding their own! It may also be necessary to allow some users or operators access to parts of the file or of records, but not to other areas. The available programs vary in their provision for security from none, through simple password protection to combinations of password and restricted access to records.

Once a program is regularly used by the same operators, they obviously develop a level of expertise which can make an 'idiot proof' data entry proceedure cumbersome and irritating. It is, therefore, a benefit if two levels of operation can be implemented to suit the operator's experience.

In addition, you may wish to consider the value of being able to extract part of an existing file and to set it up as a new file in its own right. This could be used to create archive files, or to transfer some records because a file is growing too large. The corollary of this is to be able to delete records *en masse*, because they have been transferred or because they are no longer valid.

Available software

Having spent some time discussing the practical aspects of information retrieval software, I would now like to turn to its availability and specifically to discuss some of the programs which can now be bought for library applications. Much of the standard DBMS software I have considered so far is intended for business applications and it is widely advertised in the microcomputing journals. Because it is aimed at the business user, those librarians who are using micros have generally had to accept it 'warts and all'—though in most cases it has worked perfectly well.

However, there are now a number of programs which are intended specifically for the library and information retrieval market. These are listed below, together with the name and address of a supplier: here again, it is possible to find a range from the Mini to the Rolls Royce.[14]

HOMER and Micro-CAIRS are derived from minicomputer programs (ASSASSIN and CAIRS respectively) and offer very powerful text retrieval facilities. HOMER will permit records of some 50,000 characters, will retrieve by word, phrase or specified piece of text, is linked to a word processing module, has two levels of operation (novice and expert) and the index automatically recognises plurals and similar grammatical variations.

FIRS[15] is somewhat more modest, with a maximum record size of 3750 characters, but retrieval can be by almost any text word (it will accept free text in variable length fields) and it too can be linked to word processing software. The producers claim that it should be possible to find records with one term in about 2 seconds: combinations of terms take about 15 seconds.

Aquila Eagle is a program at the lower end of the price range, but it also allows combinations of free text and fixed field information. It can also be linked to some online databases and be used to establish subsets of these databases. It is limited to 472 characters per record, and the manual does recommend that, when inverting an updated file so that searches can be carried out later, you should do this in slack periods or overnight.

Strix is a very interesting development of Aquila Eagle, running on a SWTP S/09 micro. Maximum record length is over 32,000 characters and it is capable of combining large numbers of search terms. Of particular interest is its ability to connect to a microfilm reader/printer so that records found on a database with Strix are then used to find the original document in microform and, if required, to print it. There are single and multi-user versions available.

MicroQUERY, Librarian, Rasmus and Bibliophile are more modest packages, though I would remind you again that all information retrieval packages are 'horses for courses', each being aimed at a particular market. MicroQUERY has been used with some success in a large number of schools.

Computer Cat and Golden Retriever are two American products, the first of which is sold as a computerised replacement for the card catalogue. There are plans for a linked circulation system using bar codes. Computer Cat is limited to 238 characters and the number of characters per field is determined by the program, but the claimed response time is 3 seconds or less for searches by subject, author or title. Golden Retriever is intended for 'special collections and small or medium-sized libraries'. A database of up to 4,500 records can be established on a number of floppy disks, or hard disks can be used. It even has built in MARC tags—but you can change these if necessary!

It has not been possible in the time to do justice to all these programs, but I hope that I have indicated both the range and the potential. I hope too that I have given some idea of the practical aspects of using a microcomputer for information retrieval. The possibilities are certainly there—in fact, one librarian has already suggested that 'there is no time like the present for attacking the possibilities'—and that, I would add, was in 1979![16]

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selection has been issued by the Library Association Library as one of its reading lists (available gratis from Readers' Services), while the full bibliography is included in the author's report on a British Library R and D Department project, *Microcomputer applications in academic libraries*. BLR and D (in preparation). (Library and Information Research Report no. 16)

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16. HUME, S. *op. cit.*

APPENDIX

Software suppliers

Aquila Eagle
Kent-Barlow Associates, 79 Great Titchfield St, London W1P 7FN.

Bibliophile
Dave Williams, Central Services, British Museum (Natural History), London SW7 5BD.

Checkmate
CLASS, 1415 Koll Circle, Suite 101, San Jose, CA 95112, U.S.A.

Computer Cat
Computer Cat, 3005 West 74th Avenue, Westminster, CO 80030, U.S.A.

Cortex
British Library, Bibliographic Services Division, 2 Sheraton St, London W1V 2BH.

FIRS
Central Information Service, Universtity of London, Senate House, Malet St, London W1.

Golden Retriever
CLASS, 1415 Koll Circle, Suite 101, San Jose, CA 95112, U.S.A.

Homer
MGS Computer Services, 132/133 Fairlie Rd, Slough SL1 4PY.

Librarian
Eurotec Consultants Ltd., 143 Hythe Hill, Colchester, Essex CO1 2NF.

Metalogue
Oriel Computer Services, 1-5 West St, Chipping Norton, Oxfordshire OX7 5LY.

MicroBIRD
National Law Library, (Keith R. James), Windsor House, Temple Row, Birmingham B2 5LF.

Micro-CAIRS
CAIRS Marketing & Support Section, Leatherhead Food R. A., Randalls Rd, Leatherhead KT22 7RY.

MicroQUERY
Advisory Unit for Computer Based Education, Endymion Rd, Hatfield AL10 8AU.

Primate
ISI, R & D Division, 132 High St, Uxbridge, Middlesex UB8 1DP.

Rasmus
Dudley Evans Computers, Archer House, 15 Market Square, Ely CB7 4NP.

Scimate
CITECH Ltd., PO Box 5, Ickenham, Middlesex UB10 8AF.

STAR
Cuadra Associates, 2001 Wiltshire Blvd, Suite 305, Santa Monica, CA 90403, U.S.A.

Strix
Delta Design & Graphics Ltd., Computer Services, Old Stud Farm House, Ossington Lane, Sutton on Trent, Newark, Notts.

External databases: an overview

Allan Foster

Preston Polytechnic

Paper presented to the Aslib Northern and Midlands Branches Joint Annual Conference, 18th March, 1983.

A typology for external online databases is presented and the current number of bibliographic and source databases is assessed. The nature and importance of source databases, particularly full-text and numeric services, is discussed. Information professionals must embrace these new products if they are to maintain and extend their role in information transfer.

Introduction

WHERE DOES ONE START on such a theme? You all know about online systems and databases—or do you?

I would like to explore some areas of lesser knowledge particulary looking at numeric and full-text databases. The use of online databases can help:

(i) to eliminate duplicated or unnecessary research and development
(ii) to introduce and promote the transfer of new ideas, services and technologies
(iii) to identify baseline data to help support the development of long-range plans
(iv) to simulate and forecast laboratory and economic conditions
(v) to bring buyers and sellers together
(vi) to help individuals learn about and evaluate choices in educational and leisure time activities
(vii) to identify and provide background and support data in a wide range or problem-solving situations

Statements about the huge growth of online databases and systems in recent years have become clichés. How can we make sense of the range of computerised information products that now exist? Let us first look at a well known taxonomy of databases.

1. Reference databases
(a) Bibliographic: citations and/or abstracts of printed literature
(b) Referral: references and sometimes abstracts or summaries of non-published information—organisations, individuals, audio-visual materials, ongoing research.

2. Source databases
(a) Numeric: time-series data representing measurements (kilos, £s, dollars) over time for given variable (production, exports etc)

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(b) Textual-numeric: combinations of textual information and numeric data
(c) Full text: complete text of an item—a newspaper article, a specification or a court decision

These categories are not mutually-exclusive. For instance, many databases contain a mix of bibliographic, textual and numeric data. What does an audit of publicly-available external databases show us? The most comprehensive directory of online sources is Cuadra Associates *Directory of online databases.*[1] The latest edition describes over 1300 databases available on an extra-ordinary 213 different online search systems. While many of these are American and are either not relevant nor readily available to European users, the majority clearly are. Table 1 gives an analysis of the numbers of reference and source databases, in broad disciplinary areas. These figures indicate the richness of the bibliographic databases with which we are all familiar but, more interestingly, the large numbers of source databases with which we may be unfamiliar. Taking the area where source databases are, quantitatively, most significant i.e. business, Table 2 analyses these database by type. Table 3 provides a similar analysis of technical and industrial databases. Table 4 lists the major bibliographic and numeric host systems.

TABLE 1. *Analysis of online databases*

	Reference databases	*Source databases*	*Both reference & source databases*	*Total*
Science	134	59	17	210
Technology and industries	134	190	17	341
Business	60	375	11	446
Social science and humanities	114	53	11	178
Miscellaneous	95	35	9	139
	537	712	65	1314

Source: Cuadra Associate's Directory of Online databases *and other directories.*

Full-text databases

Source databases include both numeric and full-text services. The latter illustrates a particularly interesting area of development. The main databases here include the well-known legal sources, *Lexis* and *Eurolex,* and a newcomer from Thorn-EMI's Datasolve company, *World Reporter.* This is a full-text international news database consisting of the BBC's *Summary of World Broadcasts* (SWB) and *External Services News* (ESN) from the BBC's World Service. The SWB section of the database gives economic, political and industrial information on developments in countries outside Europe and

TABLE 2. *Business online databases by type*

	Reference databases	*Source databases*	*Both reference & source databases*	*Total*
Banking	1	3	—	4
General business	22	20	5	47
Commodities	—	31	3	34
Companies	6	40	—	46
Currency exchange rate	—	12	—	12
Economics	9	101	—	110
Finance	1	52	1	54
Marketing	4	24	—	28
Securities/stocks and shares	—	37	—	37
Trade	5	9	—	14

Source: As Table 1.

North America. Linguists at the BBC Monitoring Service at Caversham listen to radio broadcasts in 50 languages from 120 countries and monitor a number of foreign news agencies providing important news stories from the USSR, Eastern Europe, the Far East, Middle East, Africa and Latin America. The *External Services News* is international and British news reports compiled by BBC correspondents as viewed from London. It has also recently added the full-text of the *Economist* to its databases. These databases are updated

TABLE 3. *Technical and industry databases by type*

	Reference databases	*Source databases*	*Both reference & source databases*	*Total*
Aviation/aeronautics	3	23	2	28
Agriculture	11	17	—	28
Automobile industry	1	12	—	13
Chemical industry	4	9	1	14
Computer industry	8	18	4	30
Electrical eng. & electronics	4	5	3	12
Energy	24	46	2	72
Metallurgy and metals industry	9	19	—	28
Pharmaceutical industry	3	6	—	9
Transportation and transport industry	9	6	—	15

Source: as Table 1.

TABLE 4. *Major host systems and numbers of databases offered*

Major 'bibliographic' hosts	*Major 'numeric' hosts*
DIALOG (180)	I.P. SHARP (84)
SDC (67)	CHASE ECONOMETRICS (83)
BRS (65)	DRI (78)
ESA-IRS (36)	GEISCO (37)
INKA (31)	CONTROL DATA CORPORATION (34)
DIMDI (30)	ADP (30)
TELESYSTEMS QUESTEL (30)	SIA (12)
DATASTAR (21)	COMSHARE (?)
BLAISE (20)	
PERGAMON-INFOLINE (15)	

European systems offering both bibliographic and numeric databases

CISI (11)
DATACENTRALEN (5)
ECHO (9)
G. CAM (21)

daily and material reaches the database within 2 or 3 days of being broadcast. Retrieval from such full-text databases using free text keyword searching can be problematic with a tendency for high recall/low precision results. This service, like most of the other full-text databases, is designed to be used by end-users and the command language is extremely simple and unsophisticated. Unlike some of the other full-text services, *World Reporter* is available for casual dial-up usage with connect time at £60 per hour and a small annual registration fee.

Many, many journals and newsletters are available online ranging from *Air and Water Pollution Report* to the *Harvard Business Review,* from *Latin American Energy Report* to *Sludge,* that well-known popular online source on sludge management! Source databases are becoming much more important and information officers and librarians, even though they might not be the people to use these systems directly (particularly if complex statistical, economic or chemical knowledge is required), must become aware of the existence and purpose of these services.

Numeric databases

Numeric databases are wide ranging in function, structure and performance and include chemical structure and nomenclature databases, chemical properties and spectra databases and similar sources in other scientific subjects. The largest group of numerical databases is in finance, business, economics and marketing and it is on this group that I will be concentrating. First some definitions. A numerical database has been defined by Luedke as 'an inert computer-readable collection of data which are predominantly numeric in nature. A *Numeric databank system* is a functioning combination of one or more databanks and a search system which can retrieve the numeric data and further manipulate the retrieved data by computational routines'.[2]

Most economic, financial and business numeric databanks are made available by commercial timesharing bureaux as part of extensive database management systems providing a range of statistical, econometric, forecasting and general business computing facilities.

Table 4 lists the major host systems providing access to these numeric databases and Table 5 is a selection of some of the major databases. Many of these databases represent data from a number of different sources. Although some represent only different packaging of government-generated data, others include information gathered by organisations in the private sector. Even those databases derived from some of the same source data can differ from one another depending on the value that has been added by the producer of the database. One value-added feature is that many of the services permit users to create their own private files of data derived from the different databases to be used in conjunction with their own data for various kinds of analyses. Another ingredient is the software that is associated with the databases for transforming data, retrieving and generating reports, modelling and performing a number of statistical manipulations. Many of the time-sharing firms offer services through database management systems (such as ADP's TSAM and I.P. Sharp's MAGIC) which have generalised capabilities for handling numeric databases. These systems are frequently defined by their statistical capabilities. Users can compute simple arithmetic functions or employ various regression techniques to generate models for analysing relationships among several time series and use the resulting models to predict values for the dependent variables. Some databanks have associated software written specifically for them which provide particular capabilities

TABLE 5. *Online business and economic numeric databases: a selection*

Marcoeconomic	*Industries*
BI/DATA (Time series and forecasts)	International Auto & Truck Database
IMF Balance of Payments	SMRB
IMF Direction of Trade	IPC Chemical Database
IMF International Financial Statistics	OECD Quarterly Oil Statistics
OECD Main economic indicators	Iron & Steel Forecast
OECD National Income Accounts	Metals Week
DRI International Trade Info. Service	*Company*
CSO Macroeconomic Databank	Exstat
European National Source (DRI)	dataSTREAM
EEC CRONOS	Compustat
Bank of England	Disclosure
Citibase	EIS X-Market
Labor statistics	

or can solve particular problems. A good example is Business International's *BI/DATA* database. This contains annual economic data from 1960 on 131 countries as well as BI's one year forecasts for 35 different countries. BI/SYSTEM has been designed to transform dissimilar units of measurement from different countries into comparable measurements.

Although still dominated by North American hosts (DRI, IP Sharp, CDC, ADP etc) and databanks, rather greater European coverage has been achieved in the last few years. Similarly, the use of these services by European users has been growing significantly. Another important development linked with this is the increasing interest shown by timesharing firms in marketing these databanks to a wider audience, including information professionals. Illustrative of this trend is SIA/CISI which offers access to the massive *EEC CRONOS* databank, amongst others, and who is a host on the Euronet telecommunications network. At the same time, the large bibliographic systems such as Dialog Inc. are increasingly making numeric databanks available on their systems. Within the last two years Dialog have begun to offer *BI/DATA*, the *U.S. Bureau of Labor Statistics* suite of databases and the *U.S. Exports* numeric databases, with the promise of more on the way. These join the well-established 'semi-numeric' *Predicasts* time series and forecasts databases which have been available on Dialog for a number of years. While these bibliographic systems do not offer the same computational facilities as those of the timesharing bureaux, they will widen public experience in the use of such databanks, even if this tends to be data retrieval rather than transformation. The identification of relevant economic databanks will be assisted by various directories including those by Cuadra Associates,[1] Eusidic[3] and Foster[4].

A new challenge

A generation of users brought up on conventional online systems may now find that the increased specialisation of the numeric systems is not insurmountable and that it is quite possible for an intermediary to acquire a good working knowledge of both the search and analysis features of many numeric systems. At what point the line will be drawn between users who are qualified to run searches of numeric data and to format or process the results in a simple manner, and those researchers and other users of the data who must themselves interact with the system in order to assure full professional integrity of the complex computations performed on the retrieval data, remains to be seen. Users of bibliographic information systems have to know both a natural language and a system language. Users of numeric databank systems must rather know the meaning of the computations performed on the retrieval data—computations that do not generally exist in bibliographic systems. The numeric systems can be said to operate on a level closer to the activity of those who actually use the data. Research carried out by Houghton and Wisdom at Liverpool Polytechnic identified many of the characteristics and backgrounds of users of numeric business and economic databanks[5]. They argue forcefully for the integration of numeric databanks, their structure and use, into information science education. They believe that with the future declining importance of paper-based collections in libraries that information professionals must get involved in databank use if they are to maintain their central role in information transfer.

Conclusion

The richness of publicly-available, interactive databases goes far beyond the bibliographic sources with which most of us are so familiar. There will be a continuing growth in databases of all kinds made available both on conventional online host systems and through videotex systems. Whether the growth in the use of these databases will support the number of commercial online systems that now exist in the market place is quite another question. The proliferation of databases and host systems poses particular problems for the information professional. It is extremely difficult to be familiar with such a number of systems, to make the necessary arrangements for accessing them and to be aware of their different command languages. While the move towards the Euronet Common Command language is healthy for users, a different set of forces is leading to database producers setting up their own systems on which to make available their own databases. The Institute for Scientific Information (ISI) has recently established just such a system. Another trend, which is unhealthy for users, is the increasing number of hosts fighting for sole rights for making available particular databases. Most of the hosts seem to be trying such tactics and this is illustrated by Pergamon-Infoline recently obtaining sole rights in offering the *Rapra* and *PIRA* databases which have subsequently been withdrawn from the Dialog service.

As we have seen, there is an increasing convergence of bibliographic, numeric and full text systems and databases. Simultaneously there is a great divergence in the range of data and information that is available through online, interactive systems. As information professionals, we can not ignore these trends if only because more and more information is either now, or will be in the near future, only available in electronic form. Libraries and information units must develop the expertise and the hardware 'infrastructure' to enable them to respond to this challenge. Obviously there will be much more direct non-user access to elctronic databases in the future and the role of the information officer will have to be re-defined. Information professionals will act as co-ordinators, consultants and guides to their users through this maze of computerised information products. There will be much greater use of microcomputers as interfaces to external online databases. These will be used, as many information officers already use them, both for offline search preparation (with cost savings) and, more excitingly, for downloading data for local manipulation and use.

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Using a general purpose microcomputer for online searching

D. M. Nicholson and *J. H. Petrie*

Andersonian Library, University of Strathclyde

Paper presented at the Aslib Northern and Midlands Branches Joint Annual Conference 'Access to information—towards 1984', Kendal, 17–19 March 1983.

Introduction

IN 1981, the Online Search Service at the University of Strathclyde began using a microcomputer, rather than an ordinary 'dumb' terminal, to search online databases. The system chosen was a Cifer 2684, a British-built microcomputer, incorporating twin Z-80 microprocessors (each with 64K RAM), the CP/M operating system, and twin 5¼″ double-sided, double-density flexible disc drives holding around 250,000 characters each. A feature of the hardware is an arrangement to enable fast transfer of data on to disc (a full description of the system is given by Petrie and Cowie[1]).

Used in conjunction with a software package developed at the University, the microcomputer simplifies log on procedures and reduces online connect time, thereby cutting costs. The availabilty of a general purpose microcomputer offers the opportunity to automate some of the administrative aspects of the online service, and can, of course, be used for other applications such as word processing.

The Strathclyde Communications Assistance Package for online searching

The Communications Assistance Package software was originally developed for the Cifer, but has also been adapted for a number of Z-80 based machines running CP/M (Altos, Superbrain, and Cromemco) and for the 16 bit Sirius. It consists of a set of programs which, amongst other things, enables:

- the storage on disc of all required log on procedures (user IDs, passwords for any number of different services), the editing of these files, and line-by-line transmission of the files to the host computer for rapid and efficient logging on,
- the offline storage of complete search strategies (and alternative strategies) which can also be edited and sent to the host computer a line at a time,
- the storage on floppy disc of search results received from the host computer,

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— the local manipulation of these results files,
— the provision of simple help data to assist the user.

An additional feature allows data such as ILL requests to be sent to a host computer in bulk. Requests can be sent to the BLLD computer at Boston Spa thus eliminating the need for telex.

An online search session

A typical online search session using the software begins, as is usual, with the search interview and the formulation of the search strategy. An editor is then used to build a file containing the search strategy which is stored on disc ready for transmission to the host computer. For example a Medline search on DIMDI might be entered completely onto a disc file as follows:

```
Base M078
F CT = Heart Valve Prosthesis
F FT = All fails$
F 1 and 2
SHOW S = 1; f = BIB; R = 1 to 10
Stop
```

Having built the file, the searcher then types 'SEARCH', chooses half duplex or full duplex when prompted, and is presented with an index showing the log on files available. A log on file is chosen and called up and sign on commences in the usual way, except that previously stored log on data is sent to the host computer quickly and efficiently using only a few keystrokes.

Once the searcher is logged on, the search strategy file is called up and sent to the host computer in a similar fashion. Since search formulations need not be laboriously typed online but can be sent error free to the host computer with minimum effort, online connect time is significantly reduced, with a consequential reduction in online connect costs (although, of course, the time saved can be used for other purposes such as conducting a more in-depth search). If desired, search results could be downloaded from the host computer at speed and stored locally on floppy disc for later processing and printing. Some database producers are beginning to recognise that it is desirable to allow this (see *Psycinfo News*[2], for example).

Ease of use of the system

After an initial practice period, use of the program is straightforward and the operator commands easily remembered. The 'search' software is operated using simple control commands of the kind described above. For example:

Control + R	to read a line from a file onto the screen
Control + S	to send the line to the host computer
Control + N	to call up a file
Control + W	to open a file for storage and search results
Control + L	for a list of commands
Control + E	change duplex

Experience has shown that use of the program allows the searcher more time to talk to the requestor during an online session, and to think about and adapt the search strategy as necessary. As with a normal terminal, additional commands and search requests can be typed in at any time during a search. Moreover, it is possible to hold these additional lines, as well as those stored on disc in a buffer for re-use if necessary (either because of line noise or for searching another database).

In-house software development or acquisition of a commercial system

Developing software locally is not always cost-effective, it being generally costly in terms of the effort required. This can be true even in a university, where a wide variety of expertise is readily available, and the atmosphere is generally conducive to such developments. Because the communications assistance package is compatible with the popular CP/M operating system, increases search efficiency and decreases costs, and provides a facility of general interest, it has proved to be a very saleable product. As a result, much of the development cost has been recouped and the benefits of the shorter search times continue to accrue.

It was recognised, however, that for some applications a more cost-effective solution could be found in the use of existing software, and to this end a commercially available information retrieval package to handle online search service administrative records is being implemented.

Automated online records management

The Andersonian Library online search service keeps records of all searches done. While a search request is current, it is necessary to update and amend the record, both to follow the progress of the search to date, and so that precise billing is possible. Once a search is complete, it is sometimes necessary, and often useful, to consult it as a guide to the conduct of new searches. It is possible to carry out these processes under the control of the microcomputer, using an information retrieval package. This enables records to be stored on disc in a relatively compact form and allows rapid retrieval of past records with a larger number of keys than is possible with a manual system. After some experimentation the FIRS[3] package, developed at the University of London, was found to provide sufficient speed and flexibility for the purpose and work has now begun on implementing a search record database.

FIRS is a general purpose, free text retrieval system for microcomputers, and incorporates a set of modules which allows the creation and structuring of databases, data entry and editing, the creating and updating of indexes, and searching, retrieval and sorting of records. An experimental database has been set up containing the following fields:

— Search number
— Requestor's name
— Address

- Academic supervisor
- Date
- Search strategies
- Hosts and databases used
- Payment method
- Offline prints
- Comments
- Cost of search
- Budget to be debited

Retrieval on data elements such as search number, requestor's name, address, supervisor, date, search strategy, hosts and databases used is possible.

Future applications of microcomputers to online searching

It seems likely that in future use of the microcomputer for online searching will increase rather than decrease. The cost of microcomputers is continually decreasing, and it is possible to envisage other ways in which the microcomputer can be harnessed to meet the needs of online services e.g. budgetary control, command language translation, local online manuals, search enhancements. Indeed there are some systems available which already offer some of these aids to online searching.

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Computerisation of an industrial information department - the use of STATUS at Howson Algraphy

Jim Hetherington,
Howson Algraphy, Leeds

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The problems facing the Information Department due to a combination of an outdated manual edge punched card information system and new requirements are discussed. The approach taken in justifying a major computerisation programme is outlined and a brief description of the application of the chosen package, STATUS is given.

Introduction

HOWSON ALGRAPHY, a Vickers Company are the leading European supplier of presensitised lithographic printing plates and graphic arts supplies. The information department was originally set up by the Algraphy Company at their factory in South London during the early sixties. An information service covering the literature in the fields of photochemistry, metal finishing, and printing technology was set up using an edge punched card system to store and retrieve abstracts. The Howson and Algraphy Companies were merged in 1970 and following this the Research and Development (R and D) department grew considerably. In 1975, R and D was centralised in new premises at the Company HQ in Leeds. By this time the information department, still based in London had built up a sizeable database containing over 25,000 items, and abstracts were being added to the system at a rate of 3,500–4,000 per year.

The information problem

After the reorganisation and relocation of R and D, management carried out a review of Company policy on information handling. The following points emerged:

The edge punched card system, because of its size was becoming unworkable. Considerable staffing effort was required to make and file cards.

Retrieval performance was becoming unsatisfactory both in terms of speed and lack of precision due to limitations of the coding system.

There was need to set up a reports documentation system covering all R and D technical reports and memos etc.

The 1974 Health and Safety at Work Act placed new responsibilities on the Company, an effective information system was required to deal with enquiries covering chemical safety both internally and from customers using our chemical products. The information department should be transferred to Leeds. Because of the considerable effort and expense that would result from the need to relocate, modernise and introduce new information systems to meet future requirements, management questioned the need for maintaining an information department.

The need for a company information department?

This fundamental question faces any information department or library manager before they can embark on any major project such as computerisation or the introduction of new services. The approach adopted in justifying the computerisation of the Howson Algraphy information department is perhaps worth relating in some detail.

Obviously, the case made to undertake the computerisation of the department covered a number of points specific to Howson Algraphy. However, an attempt will be made to generalise some of these points in the hope that they may be applied by others facing a similar situation.

It is usually very difficult to convince management of the 'value' of any particular information service, so an alternative philosophy to stress the possible consequences of not having the right information was used. In our case, emphasis was placed on the importance of information in the support of an effective R and D programme to enable the company to compete successfully against much larger multinational competitors.

Much of the information relating to high technology business areas, such as lithographic printing can only be obtained from the patents literature. Lack of information, which could lead to inadequate safeguarding of the company's inventions or infringement of competitors' patents, could give rise to severe financial penalties.

Any organisation undertaking R and D must be conscious of the uniqueness of the information it generates internally in the form of technical reports and memoranda. Without some form of information system this information, already paid for, will be lost.

Finally, particularly for organisations involved in the production of chemicals, the increasing level of national and international legislation means that health and safety information must be available to all staff involved within the company, and also to customers.

These points were sufficient to convince management that the company should maintain and modernise the information department, and that the department had a major role to play in the future.

Considerations

Having secured the future of the information department we then considered the means by which existing systems and services could be upgraded to tackle the problems outlined above.

The first possibility considered was the availability of suitable information from external services. At the time of the review (1976) the 'online age' was just dawning in Europe. *Chemical Abstracts* and the *Derwent Patent Files,* two of our main information sources were both available online. Could we therefore abandon our own database built up in the main from these sources and rely on online searching to obtain the required information?

This was not thought to be a realistic solution since abstracts were not then available online and also because the depth of indexing used was not as detailed as that already in use in our existing manual system. Further, having carried out online searches it was thought necessary to store the resulting references for future use rather than repeating the search.

Information services provided by a number of Research Associations and other commercial organisations were also evaluated but were rejected either because they did not cover the patents literature sufficiently or because we were concerned about commercial security aspects.

These findings, together with the need/to provide systems for internal reports and health and safety information dictated that we must maintain our own database and that the existing manual system should be improved or replaced.

Manual vs. computer methods

During mid 1976 advice was sought on the ways our existing edge punched card system could be improved. Various suggestions were offered including mechanical card sorters and multi level punching techniques. But none of these techniques appeared to offer much in the way of reduced labour requirements or improved retrieval performance.

The conclusion reached by the end of 1976 was that some form of computerisation was the only viable solution. At this stage our requirements were again reviewed prior to undertaking a survey of available computerised information retrieval systems. Following discussions with a number of suppliers it was decided to evaluate the STATUS free text information retrieval software package.A trial database was set up using bureau facilities at AERE Harwell and after three months of tests it was agreed that Howson Algraphy would become the pilot site for implementation of STATUS software on the ICL 1900 range computers.

A detailed description of STATUS and its implementation will not be given since this has already been the subject of an earlier paper[1]. What follows is essentially an update covering the implementation of word processor input to STATUS and the current state of the system.

The STATUS system at Howson Algraphy

The STATUS package is run on one of the Company's ICL 2950 mainframe computers alongside other online systems controlling order processing, stock control and accountancy functions.

Text input and information retrieval is carried out through the use of ICL 7700 and 7501 terminals located in the information department in R and D, linked to the 2950 by a private telephone and modem. The ICL 7700 terminal is a two screen word processor system comprising a processor with 40k bytes of memory(RAM), two dual floppy disk units and a daisy wheel printer. Text input and other functions are controlled by the Wordskil software package. To link the 7700 to the mainframe, Wordskil Manager is used. This program interfaces with STATUS and enables the transfer of text from the 7700 into STATUS input files. The 7700 is capable of operating either as a stand alone two screen word processor or with one screen acting as on online terminal whilst the other is used for word processing.

Information for input to the Technical Abstracts system is selected from published sources such as *Chemical Abstracts, Derwent Central Patents Index* and a number of other primary and secondary journals. Each item is checked against the database for possible duplication and then if 'new', a process sheet is prepared containing a copy of the item. This then forms the basis of the information which is to be input to the system.

Items are keyed in small batches (usually ten abstracts) onto disk on the 7700. On completion of each batch, a printout is produced for technical editing purposes. After editing the abstracts are then redisplayed on the 7700 screens to enable the necessary amendments to be made. Following completion of the editing phase, batches of abstracts are then transmitted from the 7700 disks to the mainframe where they are held within the Current Document Pool (CDP) in Wordskil Manager. Towards the end of each working day batches of abstracts are then transferred from Wordskil Manager to a STATUS input file. A computer batch job is then run overnight to update the STATUS database files.

The main application of STATUS is the Technical Abstracts database described above. All items selected since January 1978 have been input to STATUS and there are now approximately 20,000 abstracts online. A number of services are produced from this database including a monthly current awareness bulletin, SDI services, and bibliographies in addition to online searches.

A similar database containing details of internal documents has also been implemented and this now contains around 5,000 records. Monthly listings of reports by Department are produced from this database.

The third application is a system containing the formulations of all Howson Algraphy chemical products together with health and safety, packaging and transportation information.

A new database containing details of press tests carried out on experimental printing plates is under construction and should be operational by the middle of 1983.

Conclusions

The computerisation of the original card based system and the introduction of new information systems took about four years from the initial review up to the time when the databases were of sufficient size to be useful.

The introduction of STATUS has enabled the Information Department to improve considerably the number and quality of its services. This has been achieved without an increase in staffing, whilst keeping costs in line with the 1978 budget figures allowing for inflation.

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After PERLINE: one route to computerised housekeeping using PERLINE as a starting point

F. A. Graham
Senior Librarian, UKAEA, Risley

Outline of a paper presented at the Aslib Northern and Midlands Branches Joint Annual Conference, 'Access to information—towards 1984', Kendal, 17 March 1983

Background

THE UKAEA LIBRARY, RISLEY provides standard library services based on manual systems with a staff mostly of clerical level. Increasing demands made on ageing systems were reducing the effectiveness of the staff and the efficiency of the service.

With the assistance of the Central Computer Service, Risley, a thorough review of the Library's systems was undertaken. After examining the loans, cataloguing, acquisitions and periodicals control systems and taking into consideration the developments in other UKAEA Libraries, the periodical control system was identified as the first area for change.

Among the requirements was that there should be a gradual movement towards an integrated series of computer-based systems. These steps would be directed towards a main-frame based union catalogue with some of the routines and systems based on a library-based minicomputer.

The system selected was that on offer from Blackwell's. It was seen that by taking PERLINE as the first stage, computer experience could be built up in the Library and that subsequent stages could be based on this package.

To see the scale involved, some facts and figures:

30 K	books—ref. and loan
1 K	periodical titles
1.8 K	periodical subscriptions
750 K	patrons on circulation lists
18	buildings on the site
500 K	reports
4 K	BLL transactions per annum
30 K	loans per annum
3	Chartered librarians
12	ancillary staff and typists

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PERLINE

Created by Blackwell's as a Periodical Control System based on a local mini computer and ancillary equipment. Capable of operating in the 'stand-alone' mode as well as on 'dial-up online' to Blackwells' for the exchange of information and data.

System: A series of interelated and interactive files are housed on a DEC microprocessor at Risley. Linked to the DEC is a printer and two VDU's. There is a Modem for telephone linkage to Blackwells' through the FIBER interface system.

Files: To build the system, files are locally created. A periodical subscription is recorded on the file and its details confirmed. A file of 'Patrons' is established showing all staff who receive periodicals on circulation or for retention from the Library. This file lists all the periodicals each patron receives. The periodical holdings file is the recording file of the receipt of journals and their destinations.

Subsidiary files are needed to complete the system: a supplier file to record the sources of periodicals and an accounting file to keep track of expenditure.

Setting-up

It has to be recognised that a periodical cannot be checked-in unless there is a record of the subscription which cannot be recorded unless the system recognises the originator or supplier. A name cannot be added to the circulation list unless the patron is recognized by the patron file.

There are two parallel operations needed: establish the patron file and establish the periodical subscription file which in turn requires the creation of the supplier file.

Once these essentials are done then there are few compulsory elements in the procedures. Facilities can be used or ignored at will, for example, ISSNs can be used to identify journals but ISSNs can be ignored once they are fed in to the periodical files.

Operation

Ignoring the normal morning start-up, the daily routine is to call up the system, then the file for checking-in journals. As each periodical is checked-in the screen shows which issues have been received, which are predicted, how many of each issue have been received, how many should have been received and the action taken—claim or not claimed—or an excess of receipts over subs. If the predicted issue is received, the number of copies received is confirmed. If a claim is needed the operator can claim at once or defer it. The system will remind her of the action or inaction until it is cleared.

Having received the journal the operator can review the circulation list or she can ask for a print of the circulation lists for each copy. We batch all the list printing to reduce changing the paper—we use self adhesive labels on computer backing.

At any time the operator can enter another file to make new entries or make amendments—new patrons, new subscriptions, change of circulation list order, and so on. At the end of the day the operator sets up a 'memory' run to feed on to the main files all of the days' transactions. This ensures that changes of any files are implemented for the next days' operations.

Security

To safeguard the record, tape copies are taken of the 'memory' and stored separately. This can be done at any time or frequency, depending on your views.

To lose all the data on the machine would take almost intentional actions—there are safeguards built in to prevent accidental 'crashing'. To get into the system at all, there are checks and passwords which control access to some of the files. The enquiry desk cannot gain access to the budget file, nor can the operator gain access to the password file—those passwords themselves limit the availability of the information.

Staffing

The system is very easy to operate. Obviously, the better the operator understands the system, the greater the benefits and speed. Compilation of the files was accomplished by input at Blackwells', using their own staff, and at Risley using two clerical assistants. The two Risley operators had a three day intensive course on the system with no previous computer experience.

Costs—staffing

Before using PERLINE, one clerical assistant checked-in and circulated the periodicals with a clerical officer looking after the subscription orders, invoices and records. During the initial setting up period we had two clerical assistants with supervisory backup working on the files. This state ran from mid-September to the end of December. During that period the system was also validated by running the manual and PERLINE systems in parallel.

The present state is that one clerical assistant looks after the whole of the periodical area using PERLINE in a stand-alone mode. We expect the release of about 30–40 per cent of her time within a month or two as her operating experience increases and the system comes into full use.

Costs—cash

Excluding the equipment—the price varies with the size of the subscription list and hence the memory required—electrical and telephone installations were minimal. Stationery costs must be added—self adhesive labels cost about £30 per 1,000. Additional equipment such as another terminal and back-up printer would add about £1,600 to the equipment costs. A 'Black Box' to interface between the library and the Risley Mainframe cost about £3,000.

Hardware maintenance costs approximately 10 per cent p.a. of equipment capital costs.

Future developments

Using the equipment bought for PERLINE, BOOKLINE will be acquired. This will give access to the Blackwell bibliographic database of approx 900K items and, as Blackwell customers, certain other files in Blackwells. The system can then be used for ordering and the associated activities of expediting, checking accounts, etc., as well as cataloguing. The expectation is that a computerised Union Catalogue can then be established at Risley for the Northern Division of the UKAEA (ND) Libraries using a combination of Blackwell files and local input at Risley. The catalogue will be housed in the Risley mainframe computer which is accessible from all ND locations.

One way in—the alternative information scene

Donald W. Lee

Information Services Officer, Greater
Manchester Passenger Transport
Executive

A discussion paper presented at the Aslib Northern and Midlands Branches Joint Annual Conference 'Access to information—towards 1984', Kendal, 17–19 March 1983

ALTERNATIVE INFORMATION NETWORKS—born out of social change as part of the 1960's sub-culture—have adapted, died and been reborn in many ways until now in the 1980's they form a valuable, fascinating fringe information source completely separate from mainstream intelligence and often as far away from the Government's computerised concept of IT. as it is possible to imagine.

As with most things concerning the alternative scene their information methods and networks are unconventional by usual library/information unit standards. For instance, these networks can be a loose collective, an individual co-ordinator, a library, a network, an address list, a conference centre/hotel, a newsletter on restricted circulation, a reference book or indeed whatever it is that passes on information on a one-to-one basis. They achieve their aim of disseminating information just as well, efficiently and as reliably (indeed perhaps more so because of committed lifestyles which frequently value enjoying life rather than making money) as larger 'establishment' commercial information providers.

So far, little or nothing has been written about this alternative network and references are fragmentary and often hard to locate. One way in to this completely unfamiliar information scene, is to follow up leads personally as mentioned in such alternative bibles as '*In The Making*' or '*Alternative London*' and then to take things from there.

Being an avid collector of books, I was interested personally in the new-style publications which arose out of the 'hippy' era in the late 1960's and when I became professionally involved in information during the mid-1970's, it gradually dawned on me that the information published, being mostly ignored by straight information providers, was or could be made most useful to help me do a better job. For instance, one of my *ad-hoc* projects was to produce a scenario of likely social trends some 20 years hence.

Had I known then of the existence of the Future Study Centre with its very wide-ranging collection of papers and journals covering the full spectrum

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of future studies, both straight and alternative, then it would have made my job easier and the end result would have been better. Another example, which I frequently use for contacts and information, is that extra-ordinary book *Alternative London* originally sold on the streets of London to passers-by by a whole team of youngsters. Since it is not easy to describe just how comprehensive this book is—which I find as useful for instance as *Whitaker's Almanac*—I suggest you get hold of one and study it carefully, noticing particularly how many telephone numbers and extension numbers are given to enable you to link into the right contact very quickly. So many so-called reference books are totally lacking in such essential information and are therefore useless for networking purposes.

Therefore, I thought that as a project it could be extremely useful to try and collect some information on these alternative sources, so I began to visit certain of them as and when the opportunity arose. Details of the Future Studies Centre and *Alternative London* appear as appendices. These were randomly chosen because of my past contact with them but there will be scores, if not hundreds, of other unconventional information providers to consider.

AUTHOR'S NOTE

The purpose of this talk is therefore just to set people thinking and to start the ball rolling. If you feel that it would be worthwhile to find out more in this constantly ebbing and flowing alternative information scene, then we could perhaps get together interested people as our own inform network to cover this area more fully.

I can be contacted at Greater Manchester Passenger Transport, 2 Devonshire Street North, Ardwick, Manchester, where I am Information Services Officer in charge of the Information Unit. Telephone: 061 273 3322 (ext. 3300). An alternative reading list, compiled by the author, is also available from this address.

APPENDIX 1

Future Studies Centre

Address c/o Birmingham Settlement, 318 Summer Lane, Birmingham B19 3RL.

Telephone 021-359 3562/2113

Main Contacts Jon Abbott (Coordinator of FSC Library/ Newsletter—on secondment from Teeside Polytechnic.

Other Contacts John Fear (Administrator of B.S.)
Peter Houghton (Director of B.S.)

Library in ground floor lounge/reading room in the Settlement h/q—open to visitors during Settlement office hours (9.0 a.m. to 5.0 p.m. Monday–Friday) but phone first. Photocopier available (5p. per sheet).

Aims 'to provide a contact point—by means of a research centre and a regular newsletter—for an international network of people interested in present trends, developments and alternative options for the future. It performs the two-fold task of assembling and of disseminating information in the areas of politics, sociology, science, technology, ecology, biology, and thinking. The F.S.C. aims to reflect ongoing trends and developments rather than to promote one particular view or solution. It values its independence from any one interest group.'

Stock 500+ magazines, periodicals, newsletters (UK 150/USA 150/EEC 100/Australia 50/Middle East 50). Some books. Mostly date from early/mid 1970's to present.

Publication Future Studies Centre Newsletter (every 2/3 months). Latest issue is Vol. 9/No. 5—20 pages—edited by Christian Kunz ('currently writing up his Ph.D. at Oxford in History') who only attends the centre for a 2-week period every 2 months or so. The Newsletter reviews publcations received, gives contact/network sources, co-ordinates research projects, contains articles on specific topics e.g. 'the concept of Future Studies' and provides a diary of events. The Newsletter is available on subscription (£10.00 to Institutions; £7.00 to voluntary bodies; £3.50 to non-earners *or* by exchange).

Other services

(a) *Contacts* There is a cross-referenced contact list of several thousand resource persons and groups worldwide. 'This open filing system is there to be used by anyone who wants to link up with other people'.

(b) *Education* Occasional one-day schools are run. Topics include 'Inner City Ecology', 'Ideology for Living'.

(c) *Birmingham Settlement*—deals with inner city social problems where it is well situated being in Newtown, a deprived problem area with arguably the highest concentration of tower-block housing in the country. 'Trouble Shared' is a book dealing with its history from 1899. Also publishes Newsletters dealing with such diverse topics as Unemployment resources ('BURN'); Childlessness and sub-fertility ('NACK'), Middle Age ('Meridian') and one planned on Islands.

APPENDIX 2

Alternative London

Important This is not an information unit but is a book. Only the Box No. of Otherwise Press is to be used in communication and a stamped address envelope must always be enclosed if a reply is required.

Address Alternative London, Otherwise Press, BCM Alter, London WC1M 3XX.

Telephone No number

Contact/Editor Georganne Downes

Library/Information Unit None as such, only the editor's personal bookshelf and files which naturally reflect her interests and of course the contents of Alternative London.

The Book Alternative London (Sixth Edition 1982) is published by Otherwise Press—who is Georganne Downes. It is 336 pages long and the ISBN is 0907858007. It can be obtained at certain Alternative Book shops and also for £3.50 from Otherwise Press. The book is unique and with the right attitude of the reader can be the most valuable and comprehensive portable information unit/library/guide/friend/contact point to the whole alternative scene, not only in London, but far beyond.

Contents/Contacts/References Full addresses, contacts, phone numbers and details are given for the following general topics.

Basic Survival (Who runs London/ Housing/ Home/ Bargains/ Food/ Transport/ Money/ Social Security/ Work/ Law/ Help/ Disablement).
Flesh and Spirits (Health/ Sex/ Drugs/ Self Exploration/ Weird Stuff).
Communication (Phone and mail/ networks/ Library and Information Sources/ Arts and Media/ Computers).
Action and Involvement (Community/ Co-op/ Communes/ Legal Frameworks/ Men and Women/ Kids/ Education/ Trans-Sexual and Transvestites/ Gays/ Liberation/ Energy/ Environment/ Alternative Technology/ Nuclear Power).
Getting In and Out (Escape/ Foreigners/ Work/ Study/ Miscellaneous/ Emergency).
Index 5,000 entries, cross-referenced.

Alternative information

Ann Lawes

Information Consultant, Whitminster,
Glos.

Paper based on a presentation given at the Aslib Northern and Midlands Branches Joint Annual Conference 'Access to information—towards 1984; Kendal, 17–19 March 1983

Introduction

IT IS DOUBTFUL whether an acceptable definition of the term alternative information is at present available to us. What is certain is that someone working in a public library system actively exploring different ways of reaching the local population will take a different view from that of a commercial or business librarian.

This paper attempts to suggest some criteria by which alternative sources might be judged 'alternative' and puts forward some thoughts as to why such sources are important.

Two major concerns that exercise the minds of librarians and information officers can arguably be linked with alternative information sources—our poor public image and the under-use of information in our society. To state the obvious . . . both image and usage are affected in a major way by the value of the information we provide. We often disappoint our customers because we cannot find precisely what they want, because the information we have is out of date, incomplete, missing that vital 'flavour' type ingredient or indeed simply unobtainable through conventional library methods.

For these reasons alone it is worth investigating whether the various types of alternative information sources available to us can provide better answers than the more conventional sources that we turn to first.

Alternative sources

Possibly the most important type of alternative source is the one that our customers set up for themselves. Workshops are convened to discuss scientific and medical matters and no requirement is felt to publish papers because everyone who needed to know was deemed to be present. Authors distribute papers to all those interested long before the paper itself is published. Invisible colleges spring up all around us and we have long since identified the gatekeeper in our midst.

If it is indeed true that alternative sources can provide better information then it is because they are where one finds knowledge-based information. There is nothing new in this for the information officer working in a library

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covering a specialist subject field, but the sources that that person thinks of as standard will be another information officer's alternative source. And all non-standard sources are alternative to the generalist within the public library system.

In looking for criteria to define alternative information sources we have the principle that: 'One person's alternative source is another person's bread and butter source.' Two examples come to mind. All advertising agency information officers would regard as standard an advertisement supply service called 'Tear Sheets' run by a man called Tony Douglas and his wife from a cottage in Chiddingfold. Secondly, the magazine *Spare Rib* would probably be regarded as an alternative source by many people, but if your organisation is concerned with the training of women then the calendar of courses and conferences that it publishes is vital.

Another criteria for judging an information source 'alternative' has its roots in the purpose and the aim of the organisation concerned.

During the 1960's Charles Medawar set up the Public Interest Research Centre. His early *Social Audit Reports* were greeted with real fear in many quarters. The press was guarded in its reporting and the establishment anxiously searched for ways to discredit the information they contained. The controversy over public libraries displaying CND literature possibly has its roots in the same problem, i.e. what we believe to be acceptable, and therefore conventional, literature.

Perhaps the best example of all is *Private Eye*. In the 1920's and 30's *Punch* was the satirical, anti-establishment, investigative journal in this country but it gradually lost its edge, became cosy and respectable and was finally replaced as an alternative source by *Private Eye*. *Private Eye* has now become such an important source of information to organisations like accountancy firms and banks that it is read from cover to cover, photocopied, indexed and, in the time honoured phrase, stored in retrieval systems. It is not yet on Textline!

The characteristics we have so far discussed concern our awareness of and our opinions of different information sources. However the form that the sources take—paid for supply/service, publication or periodical—are conventional enough. The publications themselves constitute of course our old friend 'grey literature' which is normally categorised by problems of supply and bibliographic control. In this instance they are identified by the status of the source.

A further source of alternative information is informal information exchange. Gatekeepers and invisible colleges have already been mentioned but the profession also has its acquaintanceship chains and networks. The unwritten rules of such a network, the Lateral Access Network, illustrates admirably their alternative nature:

> You only ask for or send information to people you know, or have been introduced to
>
> You can only approach people for information if you don't know them if a mutual acquaintance says 'mention my name'

> Any infringement of the tacit rules of confidentiality, trust etc. will result in banishment from the network (i.e. protection of source and non-disclosure to outsiders)
>
> The greater the number of previous successful interactions between a pair, the greater the subsequent degree of trust, hence sensitivity of information passed.

There are clear indications here of access to 'better' information for a privileged few.

Information that cannot be obtained by conventional library methods was referred to at the beginning of this paper. One method that can be utilised in this situation is investigative intelligence and this technique should perhaps be included amongst our alternative information sources.

If you are working in retailing and you want current information on how a particular big department store is performing then conventional methods are virtually useless. The only way to obtain the information you need is to check out the store yourself looking at significant factors such as the walk out rate, inconsistencies in marketing practices, the timing of sales, the absence of consistent style and so on. These and similar sources of information are the only indicators that will tell you whether or not a store is doing badly early enough to be useful.

Final comment

Finally, to summarise, alternative information sources are important because they can supply knowledge-based information which is not available through standard sources. However, their exact definition and therefore how one decides what is and what is not an alternative source is more problematic, involving as it does ingrained attitudes and perceptions.

Finding out about women

Pat Darter

Librarian, Equal Opportunities Commission

Paper based on a presentation given at the Aslib Northern and Midlands Branches Joint Annual Conference, 'Access to information—towards 1984', Kendal, 17–19 March 1983

RECENTLY SOMEBODY SAID to me: 'Well of course it's not your sources which are alternative but your subject matter'. At first glance one is inclined to agree with this, but thinking about it later I thought: 'alternative? 52 per cent of the population? Can we really call that 'alternative' (in the sense of minority) and if so what have we women done to get ourselves into that position?'

Let me begin by telling you something about the Equal Opportunities Commission and then that will enable you to see the type of organisation in which I operate and the type of information I need to obtain. The EOC was set up at the end of 1975 by the Government and is the official organisation in this country charged with the oversight of the Sex Discrimination Act and the Equal Pay Act. Anybody having a complaint under either of those two Acts can approach the Commission which then has the power to investigate their complaint and see that justice is done. As I said, the EOC was set up at the end of 1975 but the Information Centre did not come into existence until 1977, so it is comparatively new with very little in the way of extensive back runs, although we are, of course, building these up all the time. We do for instance have a collection of about 300 periodical titles and we now have some 12,000 books and pamphlets. We also have a major collection of press cuttings from both the national and provincial Press, dealing with every aspect of sex discrimination and equality.

So you can see that in itself the Information Centre of the Equal Opportunities Commission is an extremely good place to start out when trying to find out information about women. We are open to the public 9.00–5.00 Monday to Friday and anybody is welcome to come in. We also deal with a large number of telephone and written enquiries and will always be pleased to help you.

As well as providing an Information Centre the EOC is a prolific publisher. All our publications are free but this in itself poses many difficulties, since because of this they do not always get listed in ***British National Bibliography***, nor indeed in ***Whitaker's Books in Print***. So how is anybody to find out about the material that the EOC itself publishes? A recent and very welcome

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newcomer to the bibliographic scene has been the *Catalogue of Official Publications not published by HMSO*—all EOC publications are listed there, together with publications from a great many other Government departments. The worrying thing is that this number is increasing. Since the Rayner investigation into the Civil Service more and more Government departments are publishing their own material instead of HMSO and their publications are therefore not included in regular listings. So this new publication is an extremely useful way of checking up on this growing area, much of which can rightly be described as grey literature.

But to return. How do we, that is the EOC Information Centre, get our information in the first place?

First, official bodies. In addition to the bibliographies that I've mentioned already, the British Library publishes *Reports and Theses*. This is a useful publication where again one finds listed much more of the grey literature which now concerns us. Other Government departments putting out useful abstracts, bibliographies and so on include the Department of Employment Work Study Unit which has a regular publication listing many of their reports, and the DHSS.

Secondly, there are other organisations which could mainly be described as voluntary bodies. These include such groups as the Volunteer Centre, National Council for Civil Liberties, National Council for One Parent Families and so on. With many of these we find it useful to take out corporate membership whereby we receive copies of all their publications, regular periodicals and generally news of what they are doing. Some of these also put out regular accession lists from their libraries.

The next category are Trade Unions, many of whom are showing a growing interest in women, who after all make up a large percentage of their members. NALGO, GMWU and BIFU have all recently produced good publications on such topics as equal opportunities, sexual harassment etc.

These first categories are at least mainly large organisations who are well organised and know how to get their literature distributed. The alternative press in this country has already been described and this is where one does start to run into trouble. As far as general information is concerned about alternative press the situation now is a great deal better than it was a few years ago. We now have a *Radical Bookseller*—this is the alternative to Whitaker's. It appears roughly once every two months and in it are listed a large number of publications coming from the small alternative presses throughout the country.

But what of the more specialised area of alternative publishing which is our own particular concern, that is the feminist press? It has already been mentioned that there comes a stage when alternative information gets to be of such good standing that it can no longer be called truly alternative. This I think is very true of that major source of feminist information *Spare Rib*. This monthly journal has been going now for more than ten years and is extremely good for listings of events, small publications, courses and so on. Nearly every group as it sets up decides that it must have a newsletter so as to make known to a wider public what its views are, what it hopes to do and so on, and we collect a wide number of these. Those from Manchester, Sheffield and Merseyside are all well established now but there are an increasing number of these local newsletters and they do pose problems both in regularity and supply. Also in Manchester we are very lucky in having a community bookshop, Grass Roots, where you can go along and just browse around to see what new material is being published. Of course these bookshops are not only useful for books and pamphlets—they have badges, posters and records and these too we purchase for our collection.

In this country, we talk about the feminist movement as being an alternative but in the States the area of women studies is an extremely respectable and accepted academic discipline. We receive a number of academic journals covering this area, *International Journal of Women Studies*, *Signs* and so on, these are just a few of the many coming from the States. In this country it seems to be mainly the Polytechnics that are accepting women studies as an academic discipline rather than the Universities and consequently we now have a few journals covering women's studies e.g. *Women's Studies International* and *Feminist Review*. Another newcomer is *Equal Opportunities International*, a useful journal for anybody wanting to get a good overview of the subject area. For ourselves it tends to be a bit too general and in fact the first issue seemed to be largely written by ex-members of the Commission staff. But, as I say, for a good general overview of the current situation this is quite a good journal.

So far I have concentrated largely on how to find out about women in this country, but we do look further afield and due to our membership of the Common Market, the Commission is closely tied up with what is happening in Europe. We collect an increasing amount of material on the women's movement worldwide. I've mentioned Europe so let us start there. The Commission of the European Communities publish a bi-monthly journal called *Women of Europe*. This is a very good round up of what is going on in Europe currently, both at an official level within the EEC and the member states, but also at a more informal grass roots level. The International Labour Organisation also publishes a journal, this one entitled *Women at Work* and again from that one gets an overview of their work and the conventions which affect women in their every day work.

The Commission is also in touch with other Commissions set up on a similar basis in countries throughout the world. Our nearest equivalent would seem to be Australia, where, because it is a federal state, every state has its own Commission as well as the federal body in Canberra. These Commissions also publish their own reports and some periodicals which we in turn collect.

So far in this paper I have concentrated very largely on journals and I'm sure I do not need to spell out to this audience how valuable they are, both for reviews and up to date news of a subject area. Certainly in a subject area such as mine they are sometimes the only means of selecting books: we are just not big enough to have a review system as many larger libraries do. When the Information Centre was first set up, it was mainly to America where we looked for the book stock, but since then an increasing number of books have been produced by English publishers. First one or two specialists, and now virtually every major publisher has some books on women in their list, and this in addition to the feminist imprints of Virago, Sheba, Only Women Press and The Women's Press. Possibly as a result of this, a number of organisations have now compiled booklists of standard works in the area of women's studies to help others build up a basic collection. Two public library authorities who have done this are Bromley and Westminster, and if I may do a short commercial here, there is also my own list *The Women's Movement* published by the Public Libraries Group of the Library Association and intended as a standard list of books suitable for branch libraries.

You will see from this how we have to be on our toes as far as sources of information are concerned. There has to be a constant scanning of periodicals not just the ones I've mentioned here, which are the more specialist ones, but many more general publications such as *New Society* and *New Statesman,* because in many of these we find something of interest to us. You will also have seen how wide ranging our sources of information are, from the official to the alternative. I have mentioned one or two major organisations working in this field but in addition you should perhaps be aware of two major libraries who have collections which compliment our own. The first is the Fawcett Library now housed at the City of London Polytechnic which has much original material from the suffragette period. Although they are adding a certain amount of current material its strength is as a historical collection. We co-operate with them in the compilation of BiblioFem—this is a microfiche catalogue, listing the joint holdings of the Fawcett library and the Equal Opportunities Commission Information Centre. It is produced monthly and is available to any institution on subscription. Any University or Polytechnic running a course in women's studies would find this an invaluable source of information. Another information source that I should mention is the Women's Research and Resource Centre, also situated in London. They too are collecting current material but are hampered by lack of funds and so this in itself poses many problems for them. There is limited access to their collection but they are happy to answer telephone enquiries.

As you will have seen from this brief paper there are no easy answers. The only thing that it would seem to demonstrate is what perhaps the 48 per cent of the population I referred to at the beginning knew already. That finding out about women is a very complex business indeed.

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An exploration into the social and economic effects of information technology

Donald Wray

Assistant Managing Director, Broadband Services, British Telecom

Paper presented as The 16th Aslib Annual Lecture at the Royal Aeronautical Society, London, 8 June 1983

WHENEVER I FIND MYSELF confronted with the type of form that one has to fill in when passing through immigration control, or registering at a hotel or applying for a credit card I can usually remember my name and address without too much difficulty but I am becoming increasingly troubled when it comes to filling in the box headed ‘occupation’. A few years ago I would have put in ‘telecommunications’ or ‘telecommunicator’ and would have felt confident that I knew what that meant even if the person reading the form did not—that is, if anyone does actually read these forms. But, during the course of last year—the year of Information Technology, IT82—it was borne upon me that telecommunications was but a sub-set of something much bigger and grander, namely Information Technology (IT). So should I say that I am an ‘information technologist’?

So here we have, straight away—albeit on a trivial level—one of the social effects of information technology. We all know that it means the amalgam of telecommunications, data processing, office machinery and perhaps broadcasting as well. The microchip comes into it somewhere, as does software. But the concept is still extremely vague and the words ‘Information Technology’ do not convey the meaning that was intended. It is rather disturbing to find oneself a member of a profession when one does not quite understand its title.

If I reverted to the old-hat occupation description of ‘telecommunications’ even that is not quite so clear in my mind as it was three or four years ago. In the past the job of a telecommunicator was to provide a channel of communication between any two people anywhere in the world virtually on demand. Telecommunicators were proud of the fact that they had created the world’s most complex and expensive machine utilising the highest of high technology—satellites, submarine cables, optical fibres and the rest. They could embark upon great projects, such as the laying of a transatlantic submarine cable, in which they would go weeks without sleep; smoking, drinking and fretting themselves to an early grave and thoroughly enjoying

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themselves in the process. But if, at the end of all this and having provided a transmission medium between continents of almost perfect performance, it could still happen that someone at one end, speaking only Chinese, would try to talk to someone at the other end, speaking only Swedish so that communication was impossible. But that was not the fault of the telecommunicator. He had done his job; he had provided the channel, the conduit. He was interested in the medium, not the conveyance of the message.

That attitude is changing. Admittedly, we do not yet have a means of automatic translation between spoken languages, except at the most simple and formalised levels. In communications between machines, however, there is an immense amount of work going on to give the network the power to translate between one computer language and another and to translate the form of the message (which may, for instance, be one firm's internal document for ordering components) into a format which is instantly understood by the recipient. The telecommunicator is now appreciating that he must go beyond the mere provision of a channel; his job is to assist in communicating between man and man, man and machine, machine and machine.

Information technology and society

I would now like to explore with you the effects of information technology on society. I have used the word 'explore' because, like so many explorations, our work in British Telecom (BT) has been spasmodic, has occasionally changed direction and has come across unexpected discoveries along the route. We discovered—although this was not unexpected—that the effects of a technology can be most clearly demonstrated when both the society and the technology are relatively simple. The effects become more obscure—and it becomes more difficult to distinguish between cause and effect—as both society and technology become more sophisticated. I will conclude with some recent developments which could have a profound effect on your particular interests.

The supreme world authority on telecommunications is the International Telecommunications Union (the ITU), which has been in existence for over 60 years. For the greater part of its existence its object has been to develop technical and operational standards so that national telecommunications systems can be interconnected in order to provide a global service. In this respect it has proved to be one of the most successful of all international organisations. More recently it has turned its attention to assisting developing countries in building up their telecommunications infrastructures; it has done this by seconding technical experts, providing training programmes, producing technical handbooks and so on. Now this programme can only succeed if the developing countries are themselves convinced that a telecommunications service will be to their benefit when compared with all the other demands upon their limited resources. So the ITU mounted a series of studies on the effects that a simple basic telephone service had on some developing societies.

Most developing countries are characterised by poor physical communications, a significant dependence on agriculture, a wealth of crafts and government-sponsored manufacturing industries. There is often the familiar drift from the countryside to the towns with all the administrative problems and squalor that it brings in its wake. This was the environment of a study carried out jointly by the Massachusetts Institute of Technology and Cairo University into almost 150 villages in Egypt which showed that the introduction of a basic telephone service produced some very significant economic benefits.

A 'benefit' was taken to mean the monetary advantage to the correspondents after the cost of the telephone call had been subtracted; it took into account what the cost would have been had they used an alternative means of communication, such as travel; the time saving, measured by the number of working hours saved; the value of losses avoided due to the use of the telephone in emergencies; and the more efficient use of capital and capital equipment. The benefit of using a telephone was found to be a factor of:

	85:1	in service organisations
	69:1	in the trade sector
	126:1	in the capital equipment sector
and	78:1	in the artisan sector.

These studies help the administration of such countries to appreciate what they lose by *not* having a telephone service. There is also a likelihood—although it is very difficult to monitor—that the availability of a telecommunications service reduces the drift from country to city by easing communications and by reducing the feeling of isolation felt by the rural inhabitants.

One might be forgiven for thinking, seeing the rapid growth in the world telephone system, that the economic benefits of telecommunications are rapidly bringing relief to the Third World. But when one realises that 90 per cent of the world's telephones are concentrated in 15 per cent of the world's nations—and these are certainly not the developing nations—one appreciates there is a long way to go.

Telecommunications needs in industry

It is a comparatively simple matter to measure the effects of introducing a telecommunications service, or, indeed, any service, when it did not exist before and when other parts of the country can be used as a control. It becomes much more difficult when the service already exists and one has to determine the effects of extensions of or improvements to the service.

The next phase of this exploration was triggered off by some activities in the EEC. For the last four years or so the Commission, and particularly the division headed by Vicomte Davignon, has strenuously attempted to improve Europe's information technology activities both as a means of improving interworking between the EEC's constituent nations and to build up European export potential in IT. A European MP asked the fundamental question: were telecommunications and information technology all that important? Should not the Commission be devoting its energies to other matters such as nuclear power, fishing, aerospace or whatever?

BT started its attempt to answer this question by establishing when the major European nations changed from being manufacturing economies to service economies. We defined the service sector as comprising the wholesale and retail trade; restaurants and hotels; transport, storage and communications; real estate transactions; and finance, insurance and business services. We found that with the exception of Ireland and Greece (which have had a large agricultural sector and have only recently established manufacturing sectors) the proportion of GDP in Community countries arising from the service sector has been steadily increasing over the last 20 years whilst the manufacturing sector has been diminishing. The cross-over point is usually when each claims about 35 per cent of the GDP. This occurred in Germany in 1975, in Luxembourg in 1971, in France in 1969 and prior to 1960 in Belgium, Denmark, Italy, the Netherlands and the UK. The proportion of employment in the service sector has been steadily increasing even more rapidly.

TABLE 1. *Change in proportion of GDP and employment in manufacturing and service sectors in last 10 years*

Country	*Change in proportion of GDP*		*Change in proportion of employment*	
	Manufacturing %	*Service %*	*Manufacturing %*	*Service %*
Belgium	−7	+5	−10	+9
Denmark	−3	+4	−6	+7
France	−3	+6	−3	+11
Germany	−4	+4	−5	+9
Ireland	−4	−4	0	+6
Italy	+1	+3	−6	+12
Netherlands	−4	+6	−8	+9
UK	−5	+4	−6	+9

Table 1 indicates that the rising contribution to employment in the service sector has been, for the most part, even greater than the increasing proportion of the GDP. This is largely because most service sector activities are labour intensive and the productivity improvement in the service sector has been much less than in manufacturing. If we translate these proportions into absolutes, we find that during the last 20 years the number of people employed in the UK in the manufacturing industries has decreased by 1.5 million but the number of people in the service sector has increased by 3.3 million. And in times of recession the service sector is much more stable than the manufacturing.

The next step in this phase of our exploration was to take some examples from the manufacturing and service industries and assess their reliance on telecommunications. The factor we used was the price they paid for their telecommunications services as a proportion of the value of their output. The current figures for the UK are shown in Table 2.

TABLE 2. *Telecommunications input ratio in UK industry*

Sector	*Telecom Input Industry Output %*
Mining and quarrying	0.7
Construction	0.8
Gas, electricity, water	0.9
Manufacturing	1.3
Services (ex. distribution)	1.8
Distribution	2.7

Summarising these figures very broadly, the telecommunications input per unit of output is about 40 per cent higher in services (excluding distribution) than in manufacturing; and distribution services make twice as much use of telecommunications than do the manufacturing industries.

So we had demonstrated that there was a relationship between telecommunications and the growth areas of the economy; but we had not separated cause from effect. However, several lines of speculation arose from the observation—made almost in passing—that improvements in productivity in the manufacturing sector were significantly greater than those in the service sector. It could be that much of this arose from an increasing use of information technology internally in the production process. If one imagined the history of a manufactured item it would commence with a rough design which would be re-drawn with precision as a blue-print which would be used for the subsidiary design of specialised tools and for ordering materials; and all of these activities consist of handling of information, as does the receipt and acknowledgement of orders, the instructions to the despatch department and the subsequent invoicing and payment. And the production process itself was being automated by computer-aided design, computer-controlled machine tools and robots, even computer-controlled stores and warehouses. So to study the relationship between the economy and information technology merely in terms of communication between companies and the outside world was to ignore the internal revolution that was already occurring in the mid-1970s. As often occurs in explorations, the intrepid explorers had reached an interesting lake but they had not discovered the source of the river.

Social effects of information technology

The fact that manufacturing productivity improvements were appreciably greater than those in the service sector led to a concentration in much of the Western world on improving productivity in the service sector. From that sprang the new industry we are experiencing today, with its word processors, electronic offices and electronic mail systems. And that in turn generates the fearful question: that if the service sectors are now employing more people than manufacturing, will the productivity improvements springing from information technology result in even more unemployment that did the automation of the physical production processes?

Just as the widespread arrival of the computer in the 1960s created the impression that 'anything can be done by software'—an impression which was rapidly followed by disillusionment as the practitioners found out the hard way just how difficult and expensive software could be—so did the arrival of information technology in the 1970s create the impression, particularly in the minds of journalists and politicians, that we would soon be living in Wired Cities. In these Wired Cities we would work at home, shop from home, carry out banking transactions from home, confer with our colleagues and access our files from home terminals and increase our range of correspondents and our span of management control. And in so doing we would be saving that valuable commodity, energy, by not indulging in unnecessary travel. There were some who held the contrary view; they said that shopping, working in offices, going to the library, and attending business meetings were all social activities which Man, a highly sociable animal, would not willingly forego. And that if people attempted to work at home they would be distracted by domestic noises and crises. Work and leisure were two distinct activities and human psychology demanded they should be carried out in different locations. What has happened in practice? Let us look at one example of the forecast IT revolutions—teleconferencing.

Teleconferencing

At present there is little enthusiasm amongst businessmen for substituting teleconferencing for travel. There are signs, however, that teleconferencing is beginning to be used in situations where a need for communication exists but where face-to-face meetings are impracticable. The US National Aeronautics and Space Administration (NASA) and also one major US airline have set up extensive networks for crisis management. In Japan, video conferencing systems are being used for frequent and urgent communications between scattered sites of large companies. Here in the UK, BT has been offering its Confravision service for a decade; utilisation has remained low but large companies are beginning to use it when briefing regional representatives at the beginning of a big sales campaign and we use it in BT quite extensively for internal conferences. The University of Wisconsin has brought educational courses to communities and individuals who would not otherwise have had access to them; and teleconferencing has been used for state hearings in Alaska, where people are scattered and travel is difficult. And in Phoenix, Arizona, the entire course of criminal proceedings have been conducted in which police interview witnesses, attorneys advise and consult their clients and the actual trial has taken place without the police leaving their stations, the attorneys leaving their chambers and the suspects leaving their cells.

So far, there has been little evidence for the de-centralisation of organisations which the more enthusiastic proponents for teleconferencing had hoped it might promote. There are, however, indications of changes in social behaviour when compared with face-to-face discussions. Teleconferences are much briefer than face-to-face meetings and are more directed to the task in hand rather than to personal exchanges. Participants are less inclined to seek personal approval so disagreements and aggressive behaviour occur more frequently. The role of the chairman becomes reinforced if he can physically control access to the microphones and cameras.

IT and the economy

In the late 1970s BT once more found itself subjected to a limitation on its capital investment and so resumed its exploration into the relationship between information technology and the economy. Our objective was to demonstrate that a modern society will become so dependent on IT that to restrict investment in the national infrastructure—the telecommunications network—would be to hamper the nation's potential for profitable growth. Admittedly there was an element of parochial special pleading in this exercise but as it turned out, the study produced results which could be of considerable benefit to individual companies.

BT commissioned two consultancy organisations, Communications Studies and Planning International and Logica to explore the potential impacts of new IT services on the economy. Eight case studies were carried out in companies which fell into four industry sectors: distributive trades, professional services, banking and finance, and manufacturing.

In each case study an attempt was made to quantify in monetary terms the benefits arising from using IT instead of other forms of communication, e.g. the use of remote terminals to enter order or payment information instead of mail or paper-based alternatives. On the whole the benefits from this aspect were fairly small. Another study was into the use of IT to reduce costs, eliminate waste or avoid losses; an example of this category was the optimisation of stock holdings between different locations. Our consultants also looked at the potential for increasing sales by improving service to customers and the savings resulting from faster decision-taking in such activities as catalogue preparation, planning cycles and the placing of investment funds. The companies which allowed themselves to be scrutinised in this way included a mail order company, an electrical retail company, an estate agent, an architect's office, a financial services company, a commercial bank, an engineering manufacturing company and a glass manufacturer.

The benefits to all these organisations was assessed in terms of a benefit/cost ratio and they ranged from 0.65:1 to 130:1 with a weighted average of 6:1. However, some of the benefits have to be regarded with some care. For instance, if the firms attribute benefits from increased sales, and if the market is not particularly elastic, then it is only a matter of time before their competitors adopt the same technology and recover their market share. If this debatable benefit is omitted from the evaluation, the overall net benefit/cost ratio falls to about 4:1.

This figure was borne out, in a slightly different context by Paul A. Strassmann, Vice President of the Xerox Corporation, who presented a paper to the IT '82 Conference in December of last year on the subject of 'Information technology and organisations' in which he examined the effect of IT on companies such as his own. In one case study he considered the cost of producing various documents using conventional office equipment and compared this with the cost when using the full panoply of electronic networks and sophisticated terminals. The improvement in cost per page ranged from 2:1 to 4:1 according to its complexity. He also showed how preparing a document for printing in the conventional manner—starting with the author's script, then going through typing, checking, the insertion of graphics, making the printing plate, printing, collating, and so on—could involve anything from 25 to 35 job steps which could be reduced to six by exploiting an electronic delivery system.

Returning to BT's studies, we attempted to assess the effects of IT on the residential sector as well as on business operations. We examined in some depth the effects on over 250 households located in some London suburbs and in a more rural environment in Cheshire. We looked at the possibilities of working from home and from using transactional service such as teleshopping and telebanking. The social and economic consequences became almost inextricably intertwined in this sort of study because many people think of shopping as a social activity and we aroused the worries, mentioned earlier, that working from home would disrupt well-established attitudes, habits and the household routine. Nonetheless there was sufficient evidence to show that benefit/cost factors could range from 0.6 to 1.1 and we came to the very tentative conclusion that by 1995 about 4% of households would have people working from home and about 20% would be using electronic transactional services.

It is an even more tentative step to extrapolate from these business and residential studies to a macro-economic aggregation to the UK economy as a whole. By far the biggest impact would be on business productivity; on the residential side, working from home, telebanking and teleshopping would probably take off slowly but could be quite significant by the end of the century. The manufacturers of communications equipment would benefit by the expanding market as would the providers of network services. A possible picture of the total benefits arising from *new* services (i.e. not including the expansion of the telephone and other current systems) would be as shown in Table 3.

TABLE 3. *UK economy wide benefits*

Benefits	1985	1990	1995	2000
Users	£m	£m	£m	£m
Business Productivity Gains	1000	4500	9600	23000
Residential Benefits	10	70	450	900
Output				
Equipment Manufacture	400	1100	2200	3900
Network Services	40	180	380	729

There are some negative aspects which should not be ignored. For instance, an increasing proportion of IT equipment consists of microelectronics components, many of which are imported. If the present tendency continues into the future, the net imports could amount to £85m in 1990 and as much as £700m in AD 2000.

Cable television

Finally, let me turn to a subject that has been exhaustively discussed during the past year: cable television. This is not the occasion to debate whether the technology should use coaxial cable or optical fibre, or how large the franchise areas should be or whether or not there should be a British content quota, (whatever that might mean) or whether there will be a visual phone service. I would like to concentrate on just two aspects: the role of the cable operator; and one of the services that might be introduced; and I am bringing them together because they could have a significant impact on your profession.

Those of you who studied Lord Hunt's inquiry into cable will remember that he distinguished between four participants: the cable provider; the cable operator, that is the person or organisation who acquires programme material and sells it to subscribers in the local cable area; the programme provider, who distributes, probably nationally, channels of feature films, sports, educational material, or whatever; and the programme producer, that is the organisation having the studios and similar production facilities. One could look at the roles of the cable operator and the programme provider in that the former is the *retailer* of services to the public and the latter is the *wholesaler*. Lord Hunt placed great emphasis on the role of the cable operator because it is he who assesses what his subscribers will want, it is he who buys in the appropriate programmes, it is he who is responsible for his product maintaining acceptable standards of decency and impartiality; and it is therefore he who should apply for the franchise to operate in any particular area. His franchise CATV period will be for 12 years in the first instance but this can then be extended or re-allocated at subsequent 8 year intervals.

Now one of the services which BT's research laboratories are working on and which could be offered over a cable system is that of a video library. It would consist of a jukebox of video discs which subscribers could call up and have played over to them almost on demand. There are all sorts of technical and operational problems which have to be tackled but they can all be solved in time. At first, the choice available to the consumer will be limited by the number of discs that can be accommodated in the local video library, perhaps a few hundred. But it is not too fanciful to imagine that local networks will be interconnected by national networks enabling the more popular discs to be stored locally and the more recondite discs housed in a few national libraries; indeed, an arrangement broadly similar to the present library system, except that the information would be passed direct to the home electronically instead of by the physical transport of books.

When that day comes one can question whether there is a need for the cable operator at all. Why should one be in the hands of a middle man who selects a range of programmes or information from which one makes a sub-selection when one can make one's own selection from the complete universe of recorded material? Will there be any need to renew franchises after the first 12-year period if the cable provider can deal direct with an association such as your own to offer the public almost unlimited choice upon demand?

I expect you can see now why I entitled my talk an 'exploration' into the social and economic effects of information technology. That exploration is still in progress and we have not yet reached the goal. We do not know whether we will discover Eldorado or some uninhabitable desert. Some say it is better to travel hopefully than to arrive; it is certainly more comfortable—and probably cheaper—if we travel electronically and not by jeep, canoe or camel.

Electronic publishing: a market perspective

John Gurnsey
Wembley, Middlesex

Outline of a paper given to the Aslib Electronics Group Conference, Chelmsford, 14–16 April 1983

Introduction

WE ARE AT PRESENT inundated with a mass of documentation covering electronic publishing. Most of this covers with varying degrees of depth—and accuracy—the technology. What is becoming increasingly clear, however, is that technical factors alone will not determine the speed of take-up of most electronic products. Already in many areas technology has outstripped our ability to find applications. Despite this, relatively little attention has been paid to other moderating factors such as economics, market forces and user attitudes. It is concern with these areas that has prompted this paper.

In concept, if not always in application, electronic publishing seems to have been with us for a long time. It has some areas of proven success; bibliographic online is one, teletext must by now be deemed another. Despite this we seem to be constantly seeking marvellous new horizons where advanced systems—be they videotex, electronic mail, document delivery, etc—serve to make our lives easier and fulfil our information needs at the turn of a switch. By now even the most optimistic amongst us has begun to realise that progress, in most areas, will be slower than predicted. This caution is shown by many of those who know most about the subject. As the emergence of radical new products comes closer, those who really know seem to say less and less. Commercial confidence is only partly to blame; electronic publishing is a very complex market area. Many of the products under development are transitionary—as distinct from transitory. In such circumstances predictions can—and have—gone wildly astray. For this reason a long overdue element of caution is now beginning to intrude itself into the literature.

Some confusion exists over the precise coverage of electronic publishing. Two distinct areas are frequently drawn, *viz*:

- — the use of electronics—and particularly computers—to facilitate the production of a conventional product;
- — the use of computers and telecommunication systems to distribute information electronically.

This division is one of convenience. The two areas are not mutually exclusive as can be seen from the use of magnetic tape both to produce a

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printed product and to provide online services. This paper will be concerned with the market for electronically distributed products. It will largely ignore the production technologies.

If a definition of distributing information electronically is accepted this covers a number of products both established and under development. These divide into four main categories:.

- — broadcast non-interactive, i.e. cable television, teletext;
- — interactive services, i.e. viewdata, online;
- — stand alone electronic products, i.e. personal computer software, video tapes, discs, etc;
- — other, i.e. the electronic journal, document delivery systems.[1]

Again the division is not mutually exclusive. Some cable television systems, like QUBE, are interactive and one French teletext system, DIODE, allows a degree of contrived interactivity.

In talking about markets for electronic publishing I would like to bring in two concepts originated by Johansen[2] and subsequently expanded by Cawkell[3]. These suggest that for any new development in information technology to be successful there must exist a readiness potential and an enabling infrastructure. The readiness potential covers such matters as the availability of suitable technology and telecommunications as well as the existence of an apparent need (market). The enabling infrastructure is concerned primarily with human factors, the service infrastructure and reliability. Cawkell's premise is that without the main criteria in each of these categories being met the products are unlikely to succeed. It is a relatively simple concept but a number of people have already lost a considerable amount of money by disregarding it. I would like to apply here some of these ideas both to established products and those finding their way through to the marketplace.

Online technologies

Online constitutes electronic publishing's most mature and established technology. It began in 1972 when Lockheed DIALOG opened up in the US with three databases. It had its origins earlier when most of the major abstract journals turned to computer aided phototypesetting for their production. This gave rise to a digitally encoded magnetic tape. Though a vital part of the whole, magnetic tape was not the only development of the late 1960s and early 1970s that made online possible. Parallel developments in disk storage, DBMS, telecommunications and low cost terminals all played a major role.

That online took off quickly, in what was for many information units a hostile environment, was not due only to the technology. The online market did not emerge spontaneously out of the blue. It was very much based upon the secondary journal market. The publishers found themselves selling to a market they knew well and could easily identify. Not only did online build on the secondary journal market, it is clear in many cases it was actually subsidised by it. Throughout most of the 1970s online charges were kept artifically low, a fact constantly reiterated by those running the services. Such pricing was designed not only to encourage usage but to cushion the publishers against the effects of online. Among many publishers there was a fear of the effect online would have on the hard copy products coupled with a parallel unwillingness to depend too heavily on income from a new technology.

Although online has proved a successful product its usage is far from saturating the European market. Many gaps exist and levels of use are substantially lower than those found in North America. Some of this slack is expected to be taken up by mid-decade when revenues from bibliographic online are expected to reach around $320 million, against a current figure of $120 million. Despite this level of income bibliographic online constitutes only a small part of a major online industry. A recent Input Ltd market research study suggested that by 1985 bibliographic online would constitute only some 22 per cent of a European online market of nearly $1400 million. As full-text services, numerical databases and data compilations like Inspec's EMIS interact with the marketplace this percentage may be expected to change and the whole market area become more complex.

As with other sectors of electronic publishing shortage of hard market data plagues the online area. One recent Link study covering 750 research organisations, universities and government bodies in Western Europe, attempted to establish why many of these organisations were not using online. Of those not using online who responded the following reasons were given:

Lack of sufficient need	33%
Lack of allocated funds	27%
No suitable/interesting databases	17%
Lack of equipment/trained staff	16%[4]

With around 700 databases now estimated to be available worldwide the lack of suitable databases probably refers more to lack of knowledge than any real awareness of what is available. Even more astonishing is the fact that 2 per cent of those replying did not use online because the log-in procedures were too complex.

Many factors make bibliographic online a non-typical electronic publishing product. Its heavy element of parallel publishing gives it a secure base from which to establish a service which can survive or fail in its own right. This—together with a captive market and a strong parallel conventional online industry demanding technical advances—provide much of the enabling infrastructure and readiness potential described by Cawkell. Such a clear pattern is less easy to see in many of the products now seeking market acceptance.

Teletext

The success of teletext in the UK has taken many in the information industry by surprise. At the beginning of 1983 BREMA figures gave an installed base of 788,000 sets reaching an estimated audience of 2.5 million. Such a figure has been achieved despite the obvious functional limitations of the system.

Its use of the VBI (vertical blanking interval) is both an advantage and a handicap. On the one side such services are cheap to run, much of the cost is already being borne by the TV company; on the other they are slow to use and very limited in the amount of data they can carry. Above all the systems are not interactive.

In the domestic market a number of clear factors made teletext attractive:

- — ease of use. It is without doubt the most 'user friendly' of all the electronic publishing media;
- — it is cheap. There is no 'for use' charge and the add-on price charged by most rental companies is computed in pence;
- — it has no hidden costs like viewdata's phone charge.

Relating this to Cawkell's premise a number of factors combined to facilitate the rapid take-off of teletext. These include:

- — the wide base of rented TV sets in the UK (around 50–60% of the market);
- — the willingness of TV manufacturers to produce cheap decoders (this has no parallel in the viewdata market);
- — the combined advertising drive of both the rental companies and the broadcasting authorities.

At present teletext use is largely confined to general interest information, news, sport, weather forecasts, etc. The problem of expanding the service lies largely in the technical constraints imposed by the system. These limit the amount of data to be carried on a page and require the constant cycling of all pages. This latter constraint means a limit to the number of pages that can be carried if response times are to be kept to a minimum. One answer is the use of a whole TV channel for teletext rather than just the VBI. With the current demand for air-space this is obviously impractical. The advent of cable with its multiplicity of channels could change this and make possible the dedication of one or more channels to teletext. This would allow an increase in data rate and the number of pages that could be carried. Combined with local buffer storage this would result in the development of a much more dynamic looking teletext product with no great loss in its current ease of use.

Cable television

Cable television has so far made little impact in Europe. Currently only 15–20 per cent of Europe's 120 million TV homes are wired for cable. Nearly all of these receive only the normal 'off air' broadcasts, the wiring being used primarily for community antenna purposes. Interest in cable concerns not only the possibility of numerous TV channels but also the availability of a wideband communications channel allowing a range of one and two-way information services. In this area cable services may yet prove a major competitor to phone based systems in the home information market.

A number of factors seem likely to affect the speed of 'cabling' in Europe. These include:

- deregulation, both the amount and the timing;
- the amount of advertising attracted to cable;
- the willingness of related industries like banking, retailing and publishing to make use of the 'extras' offered by the cable services;
- the quality, and pricing, of the programmes offered.

All these suggest that cable still has some major hurdles to clear before its use in Europe becomes commonplace. A number of wildly varying market studies have been produced and the more bullish of these do not help in giving a clear picture. One of the more considered studies produced by CIT Research is reproduced in Table 1.

TABLE 1. *Cable TV: Growth in Western Europe 1982–1992*

	1982	*1984*	*1986*	*1988*	*1990*	*1992*
No TV homes (ml)	*119*	*120.1*	*121.2*	*122.4*	*123.5*	*124.7*
cap expd ($ mill)	—	*875*	*1415*	*1615*	*1435*	*1570*
sub rev ($ mill)	—	*505*	*1535*	*2665*	*3610*	*4690*
advert rev ($ mil)	—	*65*	*285*	*600*	*970*	*1365*

Note: CIT worked on a scenario basis. The figures reproduced above represent the best scenario.

Such revenues serve to emphasise the early advertising and subscription base of the cable companies income. Longer term this may well change depending on the ability of the cable companies to introduce sophisticated electronic publishing activities. One aspect of concern to the conventional publishing industry is the ability of cable services to attract advertising income. CIT Research suggest that by 1992 cable television in Europe will attract between 1 and 1.3 billion dollars in advertising revenue. Much of this will inevitably be drawn from print currently Europe's leading advertising medium. Such a drastic loss of income could well prove disastrous to large sections of the European publishing industry.

Viewdata

The arrival of cable television serves to make viewdata, surely electronic publishing's most complex market area, even more difficult to predict. When introduced in the mid 1970's Prestel projected up to 3 million sets in use within 10 years. The impossibility of such a target was finally acknowledged with Prestel's switch from the domestic to the business market. Current (May 1983) figures puts the number of registered users at around 23,000. These are broken down as follows:

No of registrants	23,181
U.K.	22,874
overseas	307
business	18,058
home	5,100
Sets attached to Prestel	26,000
Information providers	1,065
IP's	154
sub IP's	911
Frames in use	253,073

Source: *British Telecom May 1983.*

There is now some evidence that Prestel use in the UK is beginning to take off. The Annual Growth Rate for registrants in the period December 1981 to May 1983 showed a healthy 54 per cent. Whilst this is lower than the original highly speculative predictions it is a solid base on which to build. From an admittedly small base the fastest growing market sector in this period was the domestic user with an AGR of 112 per cent. This trend tends to confirm the findings of the Link study mentioned early. Though only 4 per cent of the 750 organisations surveyed used viewdata heavily (more than £100 a month in direct charges), those who did exhibited a high degree of user satisfaction. These predicted an annual increase in their expenditure on viewdata based services of 125 per cent. This compared with a parallel growth of only 35–40 per cent in conventional online systems.

Although, at present, Prestel appears content to grow largely in the business sector long term this must change. To gain a truly mass market the service will have to turn again to the domestic user. Its second attempt is likely to prove more successful. With transaction processing, electronic mail and telesoftware, Prestel now has much more to offer. It also has a much more receptive market. The growth of personal computers, together with the general intrusion of computers into our daily lives, has produced a much more computer aware public than existed in the 1970s. To what extent this public is ready for the type of home information service originally conceived by Prestel is neither clear nor important. What is evident is that many users will come to the information services on Prestel indirectly, via use of the other facilities. Whilst this may not satisfy the egos of the IP's it does seem to give the promise of a solid growth not previously possible.

Other electronic publishing developments

In a paper of this length it is obviously not possible to review the whole electronic publishing area. As I come towards the end I would like to look at two product areas; one of which fascinates me and one of which fills me with horror.

The one which fascinates me is the whole video area. Not the growth in sales of video recorders—or even the video software outlets which seem to be springing up on every corner. My main area of interest is the potential of video as a serious publishing medium. So far video publishers have concentrated on the relatively easy entertainments market. The first serial publication I can trace in the UK, began in 1979 and was a quarterly soft pornography magazine entitled *Electric Blue*. It is depressingly inept but hugely successful. It sells 10,000 copies per issue and is now translated into five languages. Apart from the fact that the figures move the tape makes no use of the electronic format. It also misses the strength of many of the better men's magazines where the photographs are largely incidental to a powerful editorial content. A better example of the use of the electronic format can be seen in many of the video tapes produced by pop groups. These link movement and sound with sophisticated computer graphics to tremendous effect. They use, in fact, every aspect of the electronic medium.

So far, in the conventional publishing area, such initiatives have been few and far between. Partly to blame is the high cost of video preparation together with uncertainty over market factors. In the early part of 1983 three video magazines directed at doctors have been announced. Two of these are funded by advertising revenue, primarily from the drug companies; the third is subscription based. Of the free videos one has quickly reached a circulation of 7,000, whilst the priced product has struggled to sell over 1,000.

In 1982 around 1 million legal prerecorded tapes were sold in the UK. This constitutes less than 50 per cent of a total market that is dominated by pirate recordings. Virtually all of this material is directed at the entertainment market with more serious applications accounting for less than 5 per cent. Conventional publishers entering the video market are still comparatively rare. Most of those currently involved are drawn from the conventional television industry and advertising. As video becomes a more widely based medium this may be expected to change. Unfortunately most European publishers are ill-prepared to cope with the video market. The same cannot be said of their US counterparts. In the US cross industry integration has produced many firms ideally suited to dealing with a multi media society. As a result US manufacturers, who missed out on the video hardware market, look set to make a killing in the video software area.

I stated earlier that, in market terms, one electronic product frankly filled me with horror. By this I meant the electronic journal. Of all the initiatives currently in progress this seems to me to be the most extreme instance of technology push with no market pull. Given a current publishing industry in Europe and North America of around $75 billion, I find it difficult to see what size of market the electronic journal could hope to achieve. At best this seems destined to be confined to fractions of a per cent.

For those not familiar with the electronic journal it involves the writing, editing, refereeing and distribution of a scientific article with no paper intermediary. It is all done via interlinked machines. The two main studies on the electronic journal were undertaken, in the US, at the New Jersey Institute of Technology and in the UK with the Loughborough based BLEND study. Both have proved largely inconclusive. When the New Jersey study began likely application areas seemed to be with alerting journals, for example *Electronics Letters* where short items with a high priority on speed of publication are covered. This now seems to have been replaced by an emphasis on newsletter-type publications. In my opinion, in either area most of the push for the electronic journal seems to come from those involved with the technology. It seems that there is little obvious interest expressed by the marketplace and, so far, little serious attempt to determine what market—if any—might exist.

Conclusion

In this paper I have tried to consider some of the factors which influence the market for electronic products. Although many of the markets are still largely embryonic I think we can begin to see a number of factors which, in the short-term at least, are most likely to lead to success. These include:

- products having—or quickly achieving—a suitable infrastructure on which to build;
- products which can easily, and effectively, be generated by an existing publishing programme;
- products which are system independent;
- products which are undemanding of the user both in hardware costs and training;
- products which fully exploit the electronic format and do not merely reproduce what is already available via conventional sources.

Projections for the total market size of electronic publishing are currently highly speculative. One estimate puts the market at around $10 billion by 1987. Such a market, it projects, would be made up of three main areas covering; business information services, video and personal computer software. At such a size it is inevitable that electronic publishing will interact heavily with the information profession as we know it today. Indeed it is very easy to draw up a scenario in which none of the current intermediaries, i.e. publishers, libraries, brokers, etc, are involved. Though obviously extreme such a scenario points to the risks ahead. As a profession we respond poorly to the changes in technology that surround us. As a result we often have products thrust upon us which neither meet our needs nor extend our professional capabilities. Bibliographic online merely happened. As the profession most involved with its use we had little say in its arrival and even less in what has happened subsequently. If the same is not to happen in the general electronic publishing area I maintain that there is a need for the major institutions to forget their internecine squabbles and get together to give a corporate response. Without such a response the consequences for the information profession as we know it today look grim.

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Agdex—grass-roots information

Ruth M. Johnson and
Marilyn Mullay
Edinburgh School of Agriculture Library

Agdex is an indexing service to the intermediate literature of agriculture providing a current awareness and retrieval service primarily for agricultural advisers in Scotland. The development of Agdex from 1973 and the progress made from a manual index using optical co-incidence cards to an online bibliographic database is described. The processes involved in its production from the selection of material through indexing to searching the database are explained. Since 1973 the market for the service has expanded to include students involved in agricultural education and training throughout the UK. With the needs of users in mind plans for the future include coverage from a wider spectrum of material using co-operative input and the addition of informative abstracts. Long term, Agdex may become a national bibliographic database for the agriculture industry.

Background

FORMERLY KNOWN AS THE ESCA (East of Scotland College of Agriculture) information awareness and retrieval service[1], Agdex has developed into an online retrieval service to the popular literature of agriculture. Although still evolving we feel that it has reached the stage where its value can be assessed and our experience be of interest to others.

Agricultural advisers in Scotland are employed within the three agricultural colleges but may be located in small offices throughout the country. Their special information needs were not being met for a variety of reasons. There were no secondary information retrieval services in existence to support their work and they often were some distance from the main college libraries, thus exacerbating the problem. Much of the stock-in-trade literature for the general adviser, such as articles from the intermediate farming press, College pamphlets and Ministry leaflets, was virtually ignored by the large indexing and abstracting services. Agdex was developed to fill this need and is an indexing service which concentrates exclusively on this 'popular' or intermediate literature. We can rely on the Commonwealth Agricultural Bureaux, among others, to cover the 'heavyweight' scientific journals. Throughout its development Agdex has attempted to be complementary to the Commonwealth Agricultural Bureaux Abstracting service. Although the latter do scan many popular journals they extract very selectively, maintaining their editorial policy of 'scientific worth'.

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In the early seventies a member of the advisory staff realised how much time was being spent by colleagues scanning the popular literature and maintaining personal indexes of information in the form of cuttings, held in what were affectionately known as 'shoeboxes'[2]. The notion that this work could be extended and streamlined if centralised was pursued and a rudimentary indexing service began in 1973, based in the Economics Department of the School and employing postgraduates as indexers.

A limited number of keywords under broad subject headings was identified and used as a controlled vocabulary. After many amendments and revisions, this is still the pattern followed today. A thesaurus was produced in 1981 to assist with the indexing from a controlled vocabulary, and a master copy is updated regularly with additions and alterations.

In Agdex each article indexed is given a unique accession number and this, together with a full bibliographic record plus the keywords, is added to a file maintained on magnetic tape using the facilities of the Edinburgh Regional Computing Centre (ERCC). From this a monthly printout is produced of each new batch of additions together with a current awareness service using the broad subject categories assigned during indexing. The indexing became part of the work of the Library in 1977 in order to ensure consistency and guarantee comprehensive subject coverage.

Initially retrieval was by optical co-incidence cards but by the time the database had reached some 8,000 records these 'peek-a-boo' cards had become extremely time-consuming. Since the information had been stored on magnetic tape from the start the cards were abandoned and an online retrieval service developed. This has been in operation since 1980.

A small committee of general advisers meets with the Library staff from time to time to discuss possible modifications and as a result further developments have taken place. The most important move made last year allowed the general advisers at the East College offices in Perth, Forfar, Cupar and St. Boswells to search the Agdex database themselves using their own terminals and a phone link to ERCC. This has removed the need for a member of the Library staff to act as intermediary.

Having set Agdex in context we shall go on to explain each aspect of the operation in more detail.

Selection and indexing for Agdex

As already explained, the intermediate agricultural journals are included in Agdex and at the moment 42 periodicals (see Table 1) are scanned. This list is constantly under review, new journals being added occasionally or others being discarded if it is found that the articles have become unsuitable for Agdex. In addition to these journals we venture into the 'grey' literature of agriculture, i.e. material not produced through the usual commercial publishing houses, with publications from the three Scottish Agricultural Colleges and the Ministry of Agriculture, Fisheries and Food (MAFF) also included. These consist of leaflets, technical notes, bulletins etc—literature, in fact, which, although only amounting to a few pages, is considered by our advisory

TABLE 1. *Agdex: provisional list of indexed publications*

Periodicals

Agra Europe
Agricultural Engineer
Agricultural Progress
Agricultural Supply Industry
Agriculture in N. Ireland
Agritrade
Arable Farming
Big Farm Management
Big Farm Management—Supplements, 1982–
British Farmer & Stockbreeder
Dairy Farmer
Esso Farmer
Farm Building Progress
Farm Buildings Digest
Farm Contractor 1982–
Farm and Food Research
Farm Management
Farm Mixer 1982–
Farmer's Weekly
Farmer's Weekly—Extras
Farming Business
Farming Leader
Feed Compounder
Financial Times
Fish Farmer 1982–
Grass
Grass Farmer 1982–
Grower 1982–
Livestock Farming
Milk Producer
Milling Feed & Fertiliser
Nurseryman & Gardencentre
Outlook on Agriculture
Pig Farming
Pig Farming—Supplements
Poultry World
Power Farming
Scottish Farmer (substantial articles only) 1982–
S.M.M.B. Bulletin
Sheep Farmer
Span
What's New in Farming

Leaflets and Bulletins

ESCA Advisory Leaflets
ESCA Bulletins
ESCA Items 1981–
ESCA Technical Notes
NSCA College Leaflets
NSCA Technical Notes
SAC Publications
SAC Technical Notes
WSAC Advisory Publications
WSAC Technical Notes 1981–

Additional Material

MAFF Leaflets
MAFF Booklets
ADAS Results of E.H.F. Experiments

The above publications are *currently* being indexed for Agdex.

Abbreviations

ADAS	Agricultural Development & Advisory Service
EHF	Experimental Husbandry Farms
ERCC	Edinburgh Regional Computing Centre
ESCA	East of Scotland College of Agriculture
MAFF	Ministry of Agriculture, Fisheries & Food
NSCA	North of Scotland College of Agriculture
SAC	Scottish Agricultural Colleges
SMMB	Scottish Milk Marketing Board
WSAC	West of Scotland Agricultural College

staff to convey essential information. At one time too, Agdex included the many annual reports issued by the MAFF Experimental Husbandry Farms and Agricultural Research Council organisations but these were for the most part discarded when it was found that the Commonwealth Agricultural Bureaux were abstracting them. Because our advisory staff do not have immediate access to all the publications included in Agdex (their office libraries tend to be small) the library in the School undertakes to supply a photocopy of any article required.

The main indexing tools are cards which list the keywords and the thesaurus (a specimen page is in Fig. 1). There are two types of keyword card—one arranged by subject which is given to the person requesting a search, the other arranged alphabetically and used by the indexer. There are 380 keywords in Agdex and again these are regularly updated if it is found that the existing keywords cannot fully describe new agricultural developments. Those words which are in large bold type on the card form the basis of the Selective Dissemination of Information (SDI) or current awareness lists which are distributed to our advisers each month and the subjects which are covered are listed in Table 2. Two half days per week are set aside for indexing and approximately 50 articles of a page or more in length are indexed each week. The length of the article is taken into account so that the searcher can be sure he is retrieving something which is fairly substantial. On average, 5 or 6 keywords are assigned to each item and a unique accessions number is designated.

FOOT-AND-MOUTH		
FOOT-ROT	*use*	HEALTH + FEET + DISEASE
FORAGE		
FORECASTING	*use*	PLANNING
FORESTRY	*see also*	TREES
FORK-LIFTS	*use*	HANDLING AND MACHINERY
FOXES	*use*	OTHER-ANIMALS
FREEZING	pre 1980 *use*	CHILLING
FROST	*use*	WEATHER
FRUIT FLY	*use*	PESTS
FRUIT	*see also*	names of individual fruits

FIG. 1. *Specimen extract from Agdex thesaurus*

An Agdex thesaurus was introduced at the beginning of 1981. This was felt necessary for two reasons—the number of keywords and alternatives was increasing regularly and, with the introduction of an online service, users who were unfamiliar with the keywords would be conducting their own searches and something was needed to guide them. The thesaurus is laid out in such a way that the indexer can insert new words, alternatives and cross references. When the time comes for an update of the thesaurus these words can be easily incorporated as the master is held on the School word processor and, if found necessary, added to the list of words on the index card.

TABLE 2. *Subjects available for Current Awareness*

GENERAL ADVISORY—cereals, roots, legumes, other crops, grass, beef, dairy, sheep, management, extension.
LIVESTOCK ADVISORY—beef, dairy, sheep, pigs, poultry, other animals, health, nutrition.
CROP ADVISORY—cereals, roots, legumes, other crops, grass, cultivations, sowing, fertiliser, protection.
ECONOMICS ADVISORY—economics, co-operation, management, marketing, EEC, socio-economics, extension.
CEREALS—cereals.
ROOTS AND OTHER CROPS—roots, legumes, other crops.
HORTICULTURE—fruit, vegetables, flowers, shrubs.
GRASS—grass.
FERTILISER AND CULTIVATIONS—fertiliser, cultivations, sowing.
PROTECTION—protection.
SOILS—soils, drainage, trace-elements.
CATTLE AND SHEEP—beef, dairy, sheep.
PIGS AND POULTRY—pigs, poultry.
VETERINARY—health, anatomy.
NUTRITION—nutrition, trace elements.
MANAGEMENT—management, co-operation.
BUILDINGS AND MACHINERY—buildings, machinery.
HFRO—beef, sheep, deer, grass, forage, heather, bracken, forestry, hill, upland, weather, wind.

Because of the regular updating of the thesaurus and keywords, the actual indexing presents few problems. A quick scan of an article is usually enough to indicate which keywords should be used.

However, one problem which has occurred concerns the amount of information which can be gleaned from titles, a special difficulty with the popular literature. The SDI lists which are sent out monthly to advisers consist of the titles of the articles and the source, but it was found that in some cases the title gave no real indication of the article's content. For example, 'Diseases of winter cereals' is explicit while 'Winter of discontent?' is not. To improve this, we have introduced a form of title enrichment which adds a phrase or some keywords in brackets at the end of the title e.g. 'Winter of discontent?' (Hygiene during milking)—the additional phrase in this case conveys more information about the article than the title itself!

Processing

Together with the indexing this is a time-consuming operation and consequently an expensive aspect of Agdex in terms of staff time. At the moment the information on the index cards has to be transferred to punched cards, each item requiring about 5 or 6 cards per article. This continues to be done by the clerical staff in the Economics Department. It is hoped to be able to dispense with the punched cards in the near future and input the information online.

The punched cards are returned to the Computer Unit within the School to be mounted as a file on an ICL mainframe at the ERCC. A hard copy printout is returned for checking. The file can be edited directly via a VDU and once a clean version has been prepared the CATALOG[3] program is run. Within the last month a new version of the program, CATALOG 6, has been developed by ERCC which aims to be more 'user-friendly' and has new methods of online input and a new output format.

The end result of the process is a merge of the accessions into a master file with an update for the serial list and the production of the current awareness bulletins.

Serial List: this is a printout giving full bibliographic details of the month's accessions, in accession number order (See Fig 2). It acts as a cumulated index to the referenced material and may be used as a finding-list after an online search.

Current Awareness Bulletins (SDI): selective lists of references sorted into broad subject groups as described above. (For an example of layout see Fig. 3.) These profiles are run automatically on each update. The profiles have not been revised since the service was established and we are very conscious that a complete re-vamp is necessary. Some of the topics are now too general in scope and this produces vast quantities of references each month. We are also concerned about the typography of the computer printout which leaves a great deal to be desired. This aspect of Agdex is being given a great deal of thought at present because it is an area where we feel most development is required. One new feature being actively considered is the addition of short, informative abstracts to the SDIs. Since each record can be of virtually unlimited length (maximum of 32,767 characters) and with storage of up to 65,000 records per file we are not short of space!

The Serial List updates and SDIs are sent to individuals and organisations on request and, at the moment, no charge is made to government or educational institutions. We are currently mailing 49 copies of the Serial List to agricultural colleges throughout the UK. These go mainly to their libraries with a few addressed to individuals. As one would expect this pattern is reversed with the current awareness bulletins, where 226 are distributed mainly to individuals. The majority are sent to staff within the three agricultural colleges in Scotland.

Searching of Agdex

There are 4 files—1973–1975, 1976–1978, 1979–1981, 1982 to the present, containing some 13,000 references. Basic Boolean logic is used with AND, OR, NOT connecting the keywords e.g. BARLEY *AND* HERBICIDES. The actual word of command is SCAN e.g. *SCAN* MANAGEMENT AND (COMPUTER OR MICROPROCESSORS). When a number of references has been retrieved, the searcher will then be asked how the references should be displayed. There is a choice of any combination from: index number,

```
A2761                                           A2762
DIPPING INTO ENVIRONMENTAL PROBLEMS             ET-THE REAL COST (EMBRYO TRANSFER)
LEITCH J                                        HINKS J
DAIRY FARMER MARCH 1983 P98,100,121             DAIRY FARMER MARCH 1983 P111,117
DAIRY HEALTH BACTERIA COWS MASTITIS             DAIRY BREEDING COSTS EMBRYO


A2763                                           A2764
SINGING THE BLUES (DAIRY BREEDS)                TIP-TOP TACTICS (DAIRY MANAGEMENT)
LEITCH J                                        LEITCH J
DAIRY FARMER MARCH 1983 P117,119                DAIRY FARMER MARCH 1983 P126,128
DAIRY BREEDS                                    DAIRY MANAGEMENT BREEDING SYSTEMS


A2765                                           A2766
GRAIN INTERVENTION HERE TO STAY                 REMARKABLE YIELDS & PROFITS FROM SWEDES
HOWATSON G                                      LOCKHART D A S
SCOTTISH FARMER MARCH 12TH 1983 PII,III         SCOTTISH FARMER MARCH 12TH 1983 PIV,V
CEREALS ECONOMICS MARKETING COSTS GRAIN         ROOTS PROFIT SWEDES YIELDS
```

FIG. 2. *Serial List of monthly accessions*

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CEREALS
AGRICULTURAL INDEX DECEMBER 1982

TITL                                                AUTH          JRNL
HARVEST '82-HOW THE VARIETIES FARED   .   .   .     WHITLOCK R    ARABLE FARMING NOV 1982 P19,21,25
CAN THE COMPUTER HELP TO CUT CHEMICAL COSTS   .  .  .    .        ARABLE FARMING NOV 1982 P28,29
A FRESH LOOK AT SPRING WHEAT  .  .  .   .   .       LONG E        ARABLE FARMING NOV 1982 P46,47
WINTER WHEATS BREAK THE 5-TON BARRIER   .   .   .   .    .        ARABLE FARMING NOV 1982 P66
FACING THE PROBLEMS OF THE ARABLE FARMER    .   .   WALSTON O     FARM MANAGEMENT 4 (5) SPRING 1981 P187-194
BRINGING CORNCUT BACK TO JULY .  .  .   .   .       ANTILL D      GROWER 25TH NOV 1982 P24
EARLTER CROP NEEDED FOR PROCESS MARKET  .   .   .   LONG E        GROWER 25TH NOV 1982 P25,26
THREE-SPRAY PROGRAMME PROVIDES PROTECTION   .   .   BOOTHROYD I   ARABLE FARMING DEC 1982 P17,25
COMBINES AT THE CROSSROADS-ROTARY OR CONVENTIONAL . COOKSLEY J    ARABLE FARMING DEC 1982 P36,37,45
HITTING FUNGI TN THE SEEDBED  .  .  .   .   .       YATES A       BIG FARM MANAGEMENT DEC 1982 P27,21
```

FIG. 3. *Example of Current Awareness Bulletin layout*

keyword, title, author and journal. If many references are retrieved the cheapest format is to have a list of index numbers printed and then let the reader search manually through the serial list. This however can be time-consuming so we try to help by printing out the index number plus title in order to give the reader a better idea of the articles' contents. An adviser would probably choose yet another format since he would not want to spend time searching the serial list; title and journal (complete with page numbers) is a handy format for them. The Library staff use this format when sending results to enquirers who may not have access to a serial list.

Searches on Agdex can be done either by the Library staff or directly by the advisers providing they have a thesaurus and access to a terminal. The advisers are accustomed to using computer terminals for advisory programs but searching a bibliographic database online was new to them. When the system was first taken out to the offices the importance of the thesaurus was stressed. If the wrong keywords were input, no references would be retrieved, giving a false impression of the information available. At one of these meetings an adviser looking for information on sheep housing blithely entered SHEEP and HOUSING without first consulting the thesaurus. When he didn't retrieve anything it was pointed out that if he'd looked in the thesaurus he would have discovered that instead of HOUSING either BUILDINGS or SHELTER is used. On scanning these words there were several interesting references on this topic!

For those who don't have access to a terminal, contact is made with the School library either by telephone or by letter, depending on the urgency, and a search done on their behalf. Some of those who ask for a search only quote Agdex keywords but they are also asked to explain in ordinary language what it is they are looking for so that we have a better understanding of the topic. It is hoped that most searches will be completed by Library staff within one day of receipt although if an enquirer specifies that it is urgent, the search will be done immediately and the results telephoned back instead of being mailed.

The market for Agdex

Although Agdex was initially designed to meet the apparent information needs of the general adviser it has become increasingly evident that it is missing the mark in some respects. A survey of information use by general advisers which is underway in the School, indicates that more emphasis should be placed on the coverage of material which falls somewhere between farming press ephemera and scientific reports; particularly that which gives accounts of development work e.g. MAFF R & D[4].

They may be better served by a current awareness service which contains evaluated or informative abstracts of current material. A search of the database on issues of particular interest could be undertaken when required. It is also felt that the coverage of Agdex requires further development into the area of 'grey' literature. However, we have been surprised by the demand for the service from our own honours students and the agricultural colleges south of the border. This is perhaps a reflection that the student body has more time to sift through references and extract useful information. The intention is to make the Agdex database available outwith the School for anyone with the necessary equipment to search online. We have received several requests for this facility and hope to make it available as soon as possible.

The future

We can therefore identify two distinct groups of users for which AGDEX is providing the basis of a much needed information service. It is with the needs of the general adviser and the agricultural student that the future lies. With the incorporation of abstracts and the possible development of a news service and electronic messaging we hope to create a fully comprehensive information system for the applied agriculturalist and leading farmer.

The need for a fully comprehensive database to the intermediate literature of agriculture has long been recognised by information staff working in agricultural education and training. However, lack of finance and access to large mainframe computer storage have precluded developments and instead much smaller, inhouse indexing services have been produced but often including very valuable material from specialist subject areas e.g. horticulture and fish farming. Since no one library can afford the resources to abstract or even index all the material appearing in their fields of interest co-operation becomes essential. Discussions are underway between the 'National Computer Users Group in Agricultural Education' (NCUGAE) and Agricultural Librarians in Colleges and Universities (ALCU) to use Agdex as the basis for a national database, using various forms of co-operative input. It is hoped that as many printed and online services will be developed as are required to satisfy the needs of all potential users. This development will obviously inaugurate the system on commercial lines with users paying for services received. It would then seem logical to market Agdex as a commercial database like any other with, say, access through Euronet.

A system such as Agdex is never static and will continue to evolve to meet changing needs. It has developed gradually over the last ten years but may well be a very different animal at the end of the next ten.

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Non-profit marketing—libraries' future?

Crystal Condous

Department of Information Studies,
Kuring-gai College of Advanced
Education, Sydney, Australia

Libraries are facing serious competition from the 'profit' information industry which has seen the potential of an ever-increasing information service sector.

Sophisticated information retrieval systems, and management information systems are finding their way into research organisations and business corporations, areas traditionally served by libraries.

Until recently the concept of marketing non-profit organisations has been considered inappropriate, centred around the underlying theory that such organisations are not involved in an exchange process. With the extension of the exchange concept, marketing as a tool has been applied in the non-profit sector with a degree of success.

Marketing requires analysis and planning and the view that promotion is marketing is misleading. The components of a good marketing strategy include not only a promotional campaign but also product analysis, the development of appropriate outlets for the products, and an effective pricing structure.

These mix components are reviewed with an emphasis on the most neglected area, product analysis. Libraries' core products are examined and the appropriateness of the product life-cycle concept is discussed.

In conclusion, the article suggests that a change in attitude to marketing may help libraries to improve their image and to attract users. Through careful analysis, planning and implementation of marketing the survival of libraries may be less doubtful in a rapidly changing technological world.

Why marketing?

LIBRARIES BELONG TO a sector in the community which Kotler[1] has defined as the third sector in society. He considers it to be under the greatest threat. He describes the sector as 'the middle way for meeting social needs without resorting to the profit motive on the one hand or government bureaucracy on the other'. He believes that it is suffering from rising costs

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because it has no profit making operations, and that it is the first to suffer because of diminishing support and grants from the private and public sectors. Other institutions that fall into this third declining sector are colleges, hospitals, social agencies, and museums. All are institutions which fall under the umbrella of 'social'. For this sector to survive it is essential that it reassess its traditional approach of providing service.

Libraries (like many other social institutions) have been content to provide certain products and services to any person who desires or requires to use them. In the last decade however, it has become obvious that the methods used and the requirements of the clients do not correspond. Large monetary and labour investments in both procedures and inventory make it difficult for the non-profit organisation to adapt quickly to changing consumer needs. Profit organisations seeing potential in the markets have provided equivalent services, which has resulted in a loss of customers for the social sector.

This sector needs to consider implementing some of the tools that have made it possible for profit organisations to operate efficiently and profitably.

One of the tools which is appropriate is marketing. Until quite recently the usual tags that have been applied to marketing are public relations or promotion: the more critical equated it with hardsell or advertising. Marketing was considered offensive, and unethical, and those who practised it were to be treated with suspicion.

Some librarians still hold this view, and see no room for such practices in a 'not-for-profit' profession like librarianship. The reasoning is that libraries supply useful services and products, that they are a public need, that the library is an essential part of the community, and that people will use them as they have in the past without any additional effort on the library's part.

If librarians continue to subscribe to this philosophy in an era of improved and cheap computers, with increasing use of satellites and telecommunications information technology such as Prestel and Telidon, libraries may be forced to return to a 'warehouse' role not very far into the future. Threats also exist from the developing sophisticated information retrieval systems, and management information systems that are finding their way into research organisations and business corporations. If librarians are serious about providing a useful function then they need to look at their operations, their services and their customers, and adjust in ways that will prevent their role in the community from declining.

Part of the non-profit sector in the 1960's looked at the applicability of marketing for their institutions but dismissed it as inappropriate. Indefinable products, the lack of tangible organisational goals e.g. profit, and unusual distribution channels contributed to the unsuccessful application of marketing strategies to the non-profit organisation.

The marketing concept

Much of the argument that marketing was not applicable to the non-profit institutions has centred around the underlying theory of marketing which is the exchange concept. The basic model of marketing is based on the concept that a 'process occurs by which two parties freely give something of value to one another to satisfy some of their needs and wants'[2] In the classical model goods or tangible objects are exchanged for money. This definition excludes goods and services which carry only symbolic or psychological benefits.

Following, however, a controversial article in 1969 by Kotler and Levy,[3] which developed the thesis that marketing was equally valid for non-profit organisations as for business, much has been written about the concept of marketing for these organizations. One of the major moves has been to extend the concept to include the intangibles, so that 'an exchange takes place whenever something of value — whether money, goods, information or attention — is offered for something else in order to satisfy a need'.[4] In terms of the broadened concept library services and products are included. Libraries offer books, movies, audio-visual materials, answers to questions, story times for children in return for user time and attention.

Some institutions (including libraries), especially in the US, have attempted to apply marketing strategies. Far too frequently, however, the marketing undertaken has been an intensive promotional campaign aimed to draw in customers. An intensive publicity and advertising campaign which attracts users is not sufficient if the organisation cannot supply an appropriate product which is easily accessible.

Kotler[5] gives several examples of failed promotional campaigns undertaken by colleges suffering from declining enrolments in the 1970's.

The marketing process relies not only on promotion but also on a well defined marketing programme requiring a great deal of preliminary planning, analysis and testing before establishing a suitable product and eventually a successful promotional campaign.

Planning and analysis

The planning and analysis stage in such a programme requires that fundamental questions about the organisation's perceived mission, its markets, and the resources available, be answered. This is known as the market audit. An analysis of this kind would help libraries determine the objectives and goals of the organisation and help in planning future directions.

Table 1 indicates the key questions that library administrators need to answer before establishing a marketing program.

The key to the audit is determining which market the organisation can serve most efficiently. Libraries work on a principle of serving 100% of the population 100% of the time. Profit organisations have found that this approach to markets leads to complete failure since it is impossible to supply products and services that will suit the whole market at the standard that is required by the customers.

To overcome this problem organisations in the profit sector segment their markets. They tailor their products and services to the people whom they think that they can serve best. That is achieved by examing the total market, by determining the needs of each segment, by assessing the organisation's resources and by establishing which segment will respond best to its products.

TABLE 1 *Key questions for establishing a marketing programme (adapted from Kotler[6])*

Market Analysis

1. What important trends are affecting the information industry?
2. What is the library's primary market?
3. What are the major market segments in the information industry market?
4. What are the needs of each market segment in the information industry?
5. How much awareness, knowledge, interest and desire is there in each market segment concerning the library?
6. How do our public see us and our competitors?
7. How do potential users learn about our library and make decisions to join?
8. How satisfied are current users?

Resource Analysis

1. What are our major strengths and weaknesses in facilities, services, staff?
2. What opportunities are there to expand our financial resources?

Mission Analysis

1. What business is the library in?
2. Who are the library's customers?
3. Which user needs are we trying to satisfy?
4. On which market segments in the industry do we want to focus?
5. Who are our major competitors?
6. What competitive benefits do we want to offer to our target market?

If libraries used such a strategy it would allow them to take a close look at the market and enable them to divide it into manageable segments. This would enable them to identify not only the heavy users of the library but also potential user groups. Having identified the segments' needs, they could determine which segment they could serve most efficiently with the resources available.

An influential segment which is much neglected by libraries is the funder group. This segment is equally important. If there is no attempt to convince the funders of the value of the services provided by the library, then cutbacks are inevitable in the present economic climate.

To maintain a level of service that libraries consider desirable it is important to 'sell' to the funders the value of what is being provided, and to demonstrate the acceptance of those services by a consuming public. To accomplish this the library must establish a set of priorities indicating where both funds and man hours are to be placed.

The marketing mix

Once the consumer and funder markets are established, a marketing strategy can be developed by the library using the marketing tool known as the 'marketing mix'.

There are four components of the mix:

1. the product
2. promotion
3. channels of distribution
4. the price.

Promotion

A great deal of discussion has occurred over the past few years concerning one aspect of the mix, namely promotion. It is not intended to discuss this at length, but it should be recognised that promotion can be more than an advertisement in the papers, on radio and television, fliers or general advertising, e.g. posters.

Libraries have available to them other promotional tools, e.g. personal selling is often not regarded as the ideal method of 'promoting' library services, however, college, university and some special libraries do to some extent practise this type of promotion by establishing personal contacts with academics and the staff of the parent organisations. There is little evidence of use of the personal communication channels by public libraries.

Another form of promotion which has gained prominence in the marketing world is what Kotler[7] has labelled 'atmospherics'. There has been much discussion on the importance of environment and it is no longer acceptable to provide a functional building that caters primarily for products, i.e. books and other materials. To maintain the level of clients which a library has, and to convince others of the value of the services and products of the organisation, an environment which is well laid out, attractive and conducive to work is essential.

With cuts in finances most library construction has been halted; libraries that are being built are going up with minimal budgets. Librarians should be careful not to make cuts in the 'atmospherics' area. An article by Cohen[8] includes an excellent discussion on the importance of what Kotler defines as 'atmospherics'.

Apart from some aspects of promotion, e.g. advertising and publicity, most librarians have devoted little time to other promotional tools and even less on other components of the marketing mix.

Product

Libraries have devoted a great deal of time establishing what they consider to be their product and what has evolved is the core product 'information'. Libraries have been providing this generic product 'information' in all types of packaging e.g. books, audio-visual materials, video, reference answers, toys.

However, librarians have been remiss in establishing exactly what their patrons are really using. The student using a text book is not using it for its physical format, it is being used for knowledge; the old man who sits in the library reading a newspaper and talks to the librarians on a daily basis is using the library as a refuge and for social interaction; the child borrowing a toy is not interested in its mechanics but the pleasure obtained from the toy.

The products, the book, the library, the toy are simply the packaging of these problem-solving services. It is the librarian's task to 'sell' the benefits of these services not the product features. The packaging is what the user recognises however, it is the underlying core which is of interest. The problem solving services can be obtained elsewhere and libraries face competition in the provision of these services which is often more attuned to the user.

Library services are limited, extending to traditional services, such as reference, inter-library loan, storytelling. Some institutions have recognised that their users require a product that provides a totality of benefits; they have introduced more diverse services, e.g. tours of the area as part of a local history group, the provision of child care programmes over vacations, recitals and various other 'extras' which are still supported by the traditional core that is considered essential. These libraries have moved from providing services that they think their users need to supplying what they want. It must be remembered that often the *packaging* will change, for example the change from L.P. records to digital cassettes, however, the underlying *service*, the provision of quality music, remains.

This change in packaging implies that a constant weeding of collections is essential, providing a vital product range by constantly removing that which no longer gives satisfaction and replacing it with products and service packages more attuned to user needs. This must occur within the framework of the library's role in the community and its responsibilities to that community but it must be cautioned that this role should be established in an objective fashion.

The approach used in the private sector for placing a product on the market does give librarians a starting point for both introducing new products and services and for discarding them. In the private sector a product is placed on the market in response to marketing research which has shown that a market exists for the product or service. The uniqueness of the product is shortlived as competitors are quick to respond and almost immediately competitive products enter the market. The monopoly situation of the original product diminishes rapidly once the competitors join the battle. Apart from some products, e.g. energy products and some basics such as milk, eggs, etc., all products suffer an eventual decline in popularity. All products have what is known as a product life cycle, i.e. a limited life span.

The life cycle, which has four stages, is used to develop different promotional techniques, since the type of customer differs according to the stage at which the product is positioned. Shapiro[9] suggests that the product life cycle is equally applicable to libraries. Apart from the life cycle's use as a promotion indicator it can be extended to removing material that is no longer of use to the customer and the withdrawal of services that have outlived their usefulness. Caution however must be used before ailing products or services are dropped. Careful analysis should be undertaken to determine whether the product is indeed no longer viable or whether the marketing mix that has been used is incorrect.

There are four stages in the cycle, introduction of the product, the rapid growth of the products (use/popularity), competition and maturity and decline.

(1) *Introduction* — when the product is first placed on the market. Use will increase as customers learn about the product.

The type of users this stage attracts are the section of the community which likes to try all new products. It is only a small proportion of the market, but it influences other groups. The library's goal at this introductory stage should be to build awareness of the library and the availability of library services.

(2) *Rapid growth* — when the product is unique and has a monopoly because competitors have still not entered the market.
(3) *Competition and maturity* — when the product is still alive but is now under threat. At this stage product availability and marketing efforts need to be expanded to continue to maintain the level of use. At this stage people are still committed and continue to purchase (but more slowly) until a levelling off occurs.

These stages attract the attention of buyers through expanded advertising and increased product availability. In the maturity stage, however the buyers will continue to grow, but much more slowly. Competition is very strong and money is spent to lure customers from one brand to another.

The library needs to develop in potential users a library attendance habit, and must maintain user interest through special promotions by modifying the products and services that are being offered and introducing new ones. An assessment of the competition is necessary to offer products that will successfully compete for the user's time and attention.

(4) *Decline* — when products start losing a significant number of customers without replacing them. Profits and sales (or use) decrease rapidly and new products take the place of the declining product. For example, slide rules may soon disappear as the pocket calculator becomes cheaper still.

Since no users are attracted at this stage the library should eliminate products and services before they become totally unacceptable to the remaining users. However, these users must be encouraged to seek out the alternative products and services being offered if they are considered to be a potential user group.

Each stage of the cycle requires a different strategy incorporating all elements of the mix. Application of varied mixes to the life cycle will maximise use at each stage; however the life cycle as a tool does not have the capability of predicting when the product will peak but it does inform management that sooner or later a product will die. The organisation recognises that to survive it must develop new products or improve on its established ones. Libraries are not guaranteed survival and they should also seriously consider change to their product range.

What libraries must remember is that feedback from their users is an important source of new product ideas. Product ideas however, can be taken from competitors' output and that can save much time in research and development. This is a legitimate approach to the problem and librarians should not consider it unethical. To determine whether the product or services to be introduced will survive suggests the need for careful analysis and a simple checklist can provide the required preliminary information. Some of the questions a library may need to ask concerning the market are shown in Table 1.

The type of product questions requiring analysis by libraries include:

(1) Is the product or service being offered too specialised?
(2) Does the product fit in with existing facilities and skills of the library?
(3) Is it technically feasible?
(4) Will it have adverse effects on products already being offered?
(5) Does it require a heavy capital investment?
(6) Is it appropriate for the markets the library is trying to service?

Such questions need to be answered before the product is designed, and between the design stage and the release of the product it should be subjected to a test market. That gives the library the opportunity to assess whether the product will be acceptable in the market place. It also allows the library to determine user reaction, and at that stage changes can still be made to make the product or service more user acceptable.

Libraries are capable of providing a broad 'range' of products. The library offers a permanent collection, special exhibitions, story-telling hours etc., and larger libraries may offer other products, such as reproductions of prints and books held in their collections. This range of products needs to be matched against target markets. The target market must be identified in order to make the necessary changes and development to the product range. The test market analysis can assist libraries to make better choices. Changes, however, can only occur within organisational constraints and in accordance with existing technology developments, and care should be taken not to promise too much.

Distribution

The third, rarely discussed component of the mix is the distribution of the product. A library's main channel of distribution is the library building and, in some cases, the bookmobile. Little research has been done by libraries to find other ways of approaching their users.

Weigand[10] discusses the problem of fitting the product to the user. His discussion centres on the fact that different segment markets require the same product in different combinations. He suggests separate channels are important because different quantities will be required by different markets, people's responses to promotions differ, people's responses to price vary, there may be legal differences between areas, and geographical differences may create problems. He suggests that such situations require a multimarketing organisation providing each segment with a distribution channel that best suits its needs.

The library sector may need to consider provision of access to its products through independent outlets. An example of such a move would be to supply packages for information brokers and, in the process, obtain some monetary benefit. Another example is the aged user. Instead of expecting the aged to come to the library the library might consider going to the aged — the 'moving' library. The community information function may best be placed in a shop-front in the main shopping centre rather than in the library foyer. Different geographic regions may require different channels. Libraries in out-lying areas where it is difficult to reach small settlements should seriously consider rotating bulk collections.

Use also varies. There are those who are heavy users and those who are light users. It may be necessary to provide information to those categories quite differently in order to maintain their enthusiasm for the library. A heavy user who has been through the collection twice may require a different approach from a user who has read only two volumes.

Generally, libraries need to think beyond the static distribution channel where the user must in each case approach the library. Some libraries have moved away from the single distribution channel, but a great deal more research must be done to determine what other distribution channels may be appropriate for libraries. Different types of libraries will require different channels because of the differing market segments.

Price

The fourth component of the mix is the establishment of a suitable price. With the introduction of computerised information retrieval systems there has been much discussion on whether charges should be made for these services, or whether the services should remain free. There are those who think that provision of such a service is extremely expensive and that therefore costs should be recovered, whereas others see libraries as a free service where computerised information retrieval is only another tool. To this group charging for service is inappropriate.

De Gennaro[11] however, rightly points out that libraries are not free, and that there is in most cases a large capital investment. Funding, too, is required annually to maintain the organisation. In times of declining budgets libraries may find charges essential in order to remain viable. If such a situation does arise the fee for services will depend not only on the cost of the service, but on the price that the market is willing to pay. Before any pricing strategy can be established user responses to different levels of charges will need to be determined.

The growth of the profit information industry stems partly from the inability of libraries to provide services above normal library services because of the constraints of time, money and staff. To remain competitive, or more importantly, to remain in business, it may be essential for libraries to take the emotion out of the issue and look at the practicability of charges for services. It must be stressed, however, that charges for services should be set so that users can respond favourably. As with all aspects of the mix each market segment will respond differently, and what is appropriate pricing for one segment need not necessarily be so for others.

Summary

With a change in attitude to marketing, libraries will find that the marketing approach can be used to improve their image to attract users. Further, it can provide libraries with a methodology that will assist them to provide products and services that are best suited to the market segments the library wishes to serve. This paper has shown that the use of a marketing mix requires careful analysis, planning and implementation. Random action in place of carefully formulated programs is not an alternative.

If libraries draw on the marketing concept their survival may be less doubtful. Like all other organisations libraries are a grouping of people, materials and facilities seeking to accomplish a purpose in the world. In order to survive they need to attract resources from their donors or funders, they need to convert them to products, services and ideas and then to distribute them to a receptive, consuming public.

Equally important is the need for libraries to move away from the principle of 100% service for 100% of the population. No profit organisation with all its capital resources tries to achieve so much, and libraries should be content to settle for less. Libraries need to change from product-orientated to consumer-orientated institutions. They must determine what consumer needs they are trying to fulfil, and, instead of concentrating on the raw materials, they should become increasingly involved with client satisfaction. With its methodical approach, marketing can help libraries to achieve a new position in the information industry.

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Measuring the value and marketing the service: an approach to library benefit

Stuart Hannabuss

School of Librarianship, Robert Gordon's
Institute of Technology, Aberdeen

The value of libraries and information services lies in their contribution to customer information needs. As non-profit organisations, their benefit is seen less as profit than as benefit or utility to the communities they serve. They follow service goals and resource management goals, and a successful balance ensures effectiveness and efficiency. Good management methods within the organisation increase the likelihood of achieving these goals, and such methods include systematic monitoring and analysis of internal data and systematic and imaginative marketing.

Introduction

HISTORICALLY, LIBRARIES HAVE provided communities with culture, education, information, and recreation. Such provision has reflected (and arguably helped to mould) the interests and activities of the community. In fact, this relationship has been actively built into many stated library policies both here and abroad. Emphasis has been placed on access to materials or facilities, on the differential claims of various segments within that community, and on the 'public interest' dimension of libraries within the community. This last has drawn on both social and philosophical bases for its case, suggesting that free access to information is a prerequisite for a healthy functioning democracy and that easy access to recreational material plays a valuable psychological role in society at large. The goals, priorities and objectives of library services, then, have widely ranging sets of assumptions, some based on tangible elements (like service to x customers in a community of n customers, or like the provision of y documents to a research community of z scientists) and others based on intangible elements (like the 'value' obtained by readers from books, like school children from a resources centre in a secondary school or students in a university).

In the non-profit sector, libraries are not unique in this. It has been argued[1] that the Post Office has the same kind of challenge in principle, that of marrying commercial objectives with a social service role. This lies at the heart of much management activity in the non-profit area (i.e. hospitals, education, libraries, charities)—the challenge of reconciling or bringing together in compatible ways the *service goals* and the *resource management*

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goals[2]. One way of coming to understand the principles which underlie this challenge is to look at the service concept. Non-profit organisations, like profit organisations involved with services, are in the business of offering goods and services. Philip Kotler[3] would term this relationship between organisation and customer group an 'exchange' and this means that something of value is offered to someone in exchange for something else of value. In the classical sense, a product like a car or a packet of biscuits may be offered and money exchanged for them. Yet even in such a purely monetary exchange intangible or peripheral benefits may be at work—like the customer relations side of the firm, the goodwill generated, the confidence the customer has in the quality of the product or in after-sales service. A hotel may offer intangibles like prestige and atmosphere as well as rooms with a bath and meals à la carte. Such services are consumed in the process of production, as the customer participates in the 'delivery system'. Effective exchanges rely on many diverse types of management information, from knowledge of the market segmentation and customer psychology to data derived from observed behaviours or responses to the service function[4]. Kotler again argues that service organisations aim at making the client the true beneficiary, as opposed to business concerns in which the beneficiaries are the owners or the managers[5].

It is where the value of the product is commonly understood and agreed between provider and user that the market relationship operates best: as Robert Crane suggests[6] when talking about medical care, 'ideally the buyer should know what he is purchasing and should recognize the amount of positive value accruing to him through the purchase.' The need which customers bring to hospitals consists in wanting health or freedom from illness. The accumulated individual need is directed at hospital services by doctors and other intermediaries. At the same time, hospitals, while not working in a competitive marketplace, have resource management and planning goals which range from accountability for public funds to specific objectives for particular departments. Interestingly, too, management is not in direct control of the central agents of the healing provision, the doctors and nurses. There is a distinct professional role for these, tied up with its own scientific and ethical standards, which make for quality of one kind or another in their own right[7,8]. The same criteria might be applied to academic institutions. Performance goals can be set such as the number of graduates produced each session or the amount of research carried out by particular departments or the awards and grants given to staff. Performance ratios (e.g. SSR's) may help define targets in quantitative terms, and a university or polytechnic, like a company engaged in product development and community service, may wish to give its portfolio of activities satisfaction ratings (e.g. in relation to job opportunities or facilities) and sophistication ratings (e.g. levels of research, initiative for self-directed learning)[9]. And, like library service, some aspects of organisational performance will fall outside the quantitative or tangible perimeter: such qualities as 'value' and 'benefit', which are clearly provided by an effective institution of higher education, are *qualitative* and impressionistic and not readily amenable to measurement.

The value which a community, local and national, receives from, say, university research falls into this category.

Evaluation of library services

There are close similarities with the provision and evaluation of library and information services. The essential management processes of planning and organising and controlling can be found in libraries as elsewhere[10,11], and attention to such key areas of management as the effective use of time, the development of available strengths, and the need to base decisions on sound information[12] has been emphasised by many writers. Questions on effectiveness ('are we doing the right thing?') and efficiency ('are we doing the thing right?') need to be asked persistently and systematically by library managers. It has frequently been seen as a cyclical model—the provision of information being provisionally framed, then questions asked about anticipated benefits and whether they can be costed in relation to administrative efficiency, and then questions posed about how they can best be controlled and how they can assist managers to evaluate performance. This becomes in its turn the basis for the re-formulation of policy.

Whatever criteria for effectiveness and efficiency are devised, they must be translated into operational and evaluative terms. For instance, direct measures of the library's effectiveness may be seen in circulation figures of stock (i.e. a high stock utilisation rate) or in a favourable relationship between a user education programme and students' use of library resources in significant areas. Efficiency may be seen in rate of acquisitions (other things being equal, i.e. if such output is indeed a categorical measure of success), the timely manning of service points to preclude queueing and user discontent, and the policy of stock relegation and withdrawal. One merges with the other when the service concept is brought into account, particularly when this is allowed to include user satisfaction in addition to the capability of the library to perform. It is much easier to measure the recall and precision and currency of information provided, say, by an online database service than the value or benefit to a group of users throughout an academic session, and it is even easier to measure costs per minute spent on online searches. There are levels of complexity, then, or of conceptual difficulty, when considering the performance of libraries[13]. Criteria like 'significance' to mean how the library relates to service philosophy within the community and 'achievement' to mean how capable the service programme is in meeting need[14] are eligible only up to a point for quantitative measurement. Others include 'availability', to mean how locatable, identifiable, deliverable a document is vis-à-vis the user's time interval of acceptability (i.e. access plus delivery time). Even on a criterion like 'utilisation', when a user actually receives a document from the library or information system, there are layers of potential ambiguity: for example, the various and often multi-layered and unexpressed reasons for failure. The library, then, can measure its effectiveness or 'value' in quantitative and qualitative ways. On the tangible end of the spectrum are activities or products like:

(a) current awareness services and the take-up rate
(b) the rate of coverage of a specific area of departmental use
(c) response time
(d) journal binding policy
(e) in-house and external services use patterns (e.g. in an area like inter-library loans)[15,16]

It is often difficult to compare even measurable data like this when more than one library service is involved, and some measures, like Orr's document delivery test, is best applied comparatively[17]. Another element in this process to cause concern among professional librarians is the statistical complexity of some techniques employed to measure services[18,19].

User needs

Ultimately, what the library manager is aiming to achieve is a flexible, responsive, forward-looking information service. Evidence for success or failure will emerge from internal resource management activities (e.g. answers to such questions as 'what are our available resources?', 'our available means?', 'our constraints of staff and finance, our limiting factors?' 'what are our standards going to be?' and 'how can resources be allocated to best advantage to user response?') and from external service performance (e.g. how the market behaves in response to the service). Ideally there is a marriage of perceived values, a consensus of values, between managers and users. However else it is seen, evaluating the effectiveness of library and information services is closely bound up with user needs and demands and the extent to which those needs and demands are satisfied. If we choose to see this process on two levels, that of measurable use of services (e.g. the number of reference enquiries per week, or requests from Chemistry staff per term) and that of the perceived benefit from the users' viewpoint, it may help to clarify the problem of defining terms. What has been called the pathology of library provision was sensitively probed by a study conducted by the Lancaster University Library Research Unit[20] into availability. An inverse relationship between satisfaction level and collection bias was discovered (i.e. the higher the percentage of immediate availability the lower the percentage of browsing material). Since it was thought that a satisfaction level of 60% was low, efforts were made through the introduction of a variable loan policy to improve this level. As Oldman says in describing and reviewing the experiment:[21]

> The most popular 10 per cent of the collection was made subject to a one week loan period and carefully monitored. This policy led to a massive increase in borrowing. Satisfaction level shot up but then returned to its former level. An improvement in the system's performance had the effect of releasing previously suppressed preferences. This process has brought into the vocabulary of librarianship the concept of the homeostatic library. Demand and supply will tend to find their own level. It is suggested that the level for academic libraries with open access is around 60 per cent.

And in her own research into *The beneficial library*, conducted in the years up to 1977[22], she argued that *usefulness* was not equivalent to *use* when it came to library evaluation, and that *user benefit* was a crucial notion in resource allocation decisions. She argued against the view that users' wants and expectations are too vague to be reliable measures of effectiveness in library service, and suggested that they formed essential constituents of user satisfaction, i.e. of the benefit the library was able to offer to its community.

Systems thinking

Closely connected with organisational performance in this field has been systems thinking, in particular ideas associated with the benefits accruing to a library from its setting out to be an open and responsive system, an organismic as opposed to a mechanistic model. Oldman claimed[23], for instance, that the Lancaster procedure was product/organisation orientated and therefore arguably mechanistic. A swift contrast may be made with a user-orientated measure like the 'derived value' measure (which Oldman used[24] and which has subsequently been used by other researchers[25] which emphasised the expectations and perceived actualisations in the interaction between user and library. Another concept used by some writers derives from economics, that of *utility*—the satisfaction, pleasure or need-fulfilment derived from consuming some good, and the large literature on cost-effectiveness draws on such concepts in its search to pin down valuations on library services. Related to this, too, is the notion that users have a prescribed 'time-information' space, indicating that information (particulary in scientific research) is highly time- and situation-dependent with regard to its value for a particular user[26].

Systems thinking has been particularly influential on library management theory and practice. Of many reasons for this, two are:

(a) that library managers perceive their organisations as highly responsive and environment-orientated service systems;
(b) that librarians and information workers have found the concepts of systems thinking useful in describing automated services and information/house-keeping/acquisition systems.

Model building has been helped and stimulated, and organisation analysis clarified by such ideas. The interfaces which an organisation has with its environment are particularly dynamic in service operations like libraries. Academic libraries, too, have found that, in the face of financial cutbacks, being responsive to change is essential. Many libraries in higher education have switched collection building and provision policies to 'steady state' in which a discard and relegation rate matches acquisition, in the interests of maximising space and optimising stock and its use and availability. Systems thinking, too, has enhanced the mental landscape within which librarians can visualise their activities in relation to their parent institution (or metasystem), and the mathematical or operational research aspects of systems thinking have also had some appeal and application[27]. The broader principles of systems thinking have been absorbed by practising librarians and commentators, and have accelerated the movement, particularly in academic libraries, towards thinking of the service as highly influenced by market forces and user perceptions and responsiveness. It has encouraged user studies and surveys, and reinforced the value of community profiles. The influential American *Planning process for public libraries*[28] operates on the principle that planning is highly responsive to user behaviour and attitudes, and many of its measures of performance (e.g. user service hours, availability analysis, accessibility of library facilities) and its information gathering recommendations are highly user-orientated. Goals, internal and external data, and decisions are intermarried fully: e.g. percentage of total and per capita expenditure on specific materials, materials turnover rates and priorities in service reductions.

Marketing the service

It has been suggested so far that there are a number of ways of looking at performance measures and value or benefit in library and information work, and that systems thinking has been an important influence. Equally or even more significant has been the influence of *marketing*. In an informal sense, libraries are used to promoting their wares to their customers. They are aware of segments of the market, of the desirability of stimulating demand in unmanifested areas of the market, of giving client satisfaction, and of planning and controlling and forecasting the range and use of their product. The literature of library promotion as such[29] tends to emphasise the colourful aspects of the subject, and to disregard the costing of promotion ventures and only recently to see the crucial significance of marketing procedures and concepts[30]. So what should be said about marketing the product and the service?

If one works on the assumption that the value of a system is the degree to which it contributes to user needs[31], then marketing has much to offer library management. Marketing is 'the management function which organises and directs all those business activities involved in assessing and converting customer purchasing power into effective demand for a specific product or service, and in so doing enables the achievement of profit targets or other objectives set by the organisation[32]. It takes in the market environment—their geographical, status, financial and other diversity, as well as buyer behaviour and motivation (needs and wants and perceptions). By marketing research it seeks to establish and analyse data on the basis of which the organisation can develop and improve its product to meet demand with effective supply. Product, pricing, and distribution can be determined with this data. There is also a control element as management seeks to determine if goals are being met, and such goals may be customer satisfaction, high profits from high volume sales[33], and improved efficiency. This activity, that of *finding out and making known*, and of reducing the possibility of error in getting goods to the customer, is not just a suitable metaphor for library and information services: it is inherent in information work and the marketing approach, in being intensively user-orientated, is a particularly valuable approach for contemporary libraries. It makes sense for libraries to know:

- market characteristics
- market segments
- market research techniques
- what motivates the user
- the product and service cycle concept

In the case of an academic library in the higher education sphere, its public is a conglomerate of discrete segments (staff, students, research students, others), and service objectives can be focused on particular target groups via particular services and through this management can derive a precise idea of performance (e.g. provision and response in the area of scientific journals in relationship to a new course or to staff in department X or Y). Priorities and even cost-benefit comparisons can be reached. Measures like speed of response by the library, and appropriateness of material (level, currency, cost) can be assessed in relation to patterns of demand *and* in relation to expressed preferences/opinions. Similarly, the concept of distribution is useful in library work, particularly a multi-site service like that in Robert Gordon's Institute of Technology, alerting library managers to levels of service which might ideally and practically be provided at various service points, where these should be in relation to traffic flow of users and preferred patterns of access, and times when access is feasible.

Costs and benefits

The product itself—information in its many forms and levels—is likely to be better if two-way communication is established, and the users' demand for the product are likely to be more positive. Bellardo and Waldhart stress this:

> '... a patron's receptivity to, and demand for, an information product is much more likely to be positive if the design and introduction of that product or service is preceded by a careful analysis of the needs and wants of the users and the market situation.'[34]

A controversial dimension of offering information as a product is that of its price. In one sense, except in pay-as-you-use information services like some special libraries and on-line systems, no direct payment is made to the library by the customer. This has not prevented a long-lived argument for the introduction of charges for services in libraries, and for the tiering of services in technically free libraries so that fully cost-recovered specialised services (e.g. an online search) can be offered without a sense of betrayal of professional ethics and also within the law. There is a close link between *value* and *willingness to pay* for some customers in some information services. Despite this debate, for the most part libraries are seen, like hospitals, as non-profit organisations. Customer satisfaction rather than profit is one of the key goals: therein lies the basis of its exchange relationship with the customer, and, in Kotler's words[35], 'concepts of profit maximisation and promotion must be translated into benefit-cost maximisation so that marketing models can apply'... to non-profit organisations (like libraries). The academic library aims to provide tangible benefits in the form of up-to-date and relevant monographs, readily available and attractively displayed issues of current journals, back-runs of journals and microfiche versions of externally held documents (e.g. *Dissertation Abstracts*), appropriate indexing and abstracting and current awareness tools in both manual and automated forms, and adequate and congenial study accommodation.

Even though libraries are generally not directed towards profit, they can profitably take on board many of the principles and practices of marketing. The marketing *mix* is a useful concept, including product design, pricing, communication, and distribution, and directing managers' attention to the preferred combination of *product* provision and *service* provision which welds together the commodity of information with the activities and attitudes of the staff and the responses of the users. One may see this mix as part of a marketing strategy, with utility and product currency and staff-user interface at the centre. An open system thrives on feedback from engaged members of the market environment[36], particularly in academic environments where users are highly motivated to use the service.

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Letter to the Editor

PUBLICATIONS OF THE CRYSTALLOGRAPHIC DATA CENTRE

Readers of a recent article in *Aslib Proceedings*[1] may be interested to learn of a little more SERC support for the Data Centre than he describes. He mentions a collaboration with the Daresbury Laboratory, providing online access via the SERC network, but he does not describe the collaboration on publications with the Atlas Centre of the Rutherford Appleton Laboratory.

Early in 1976 we were approached by the Crystallographic Data Centre for assistance with their computer typesetting problems. The SERC had just purchased an FR80 microfilm recorder, one of the few which could combine high speed with high quality text and graphics at that time. The Data Centre publication 'Molecular Structures and Dimensions' is a 'current awareness' volume which needs these features and must be produced accurately and quickly. Staff at the Atlas Centre designed and wrote new software to handle the complex layout with many Greek letters and sub/superscripts needed in the bibliography, and which are not commonly available in commercial typesetting.

The first part of the project is described in detail in: Allen, F.H., Kennard, O., Watson, D.G., Crennell, K.M. Cambridge Crystallography Data Centre 6. Preparation and Computer Typesetting of 'Molecular Structures and Dimensions' Bibliography Volumes *Journal of Chemical Information and Computer Science* **22,** 1982, pp. 129–139.

Since then I have improved the program to handle the automatic page layout of text and varying sizes of chemical diagram, which were published for the first time in volume 13.

Some idea of the quality of the FR80 can be gained from the sample pages from the main bibliography and the diagrams index. The FR80 is not only high precision, but also high speed. This year's volume contained 6256 references and cross references and 3912 diagrams. Over 750 pages were plotted in just over 2½ hours, at an average rate of 12 seconds per page.

K.M. CRENNELL
Atlas Centre, Rutherford Appleton
Laboratory

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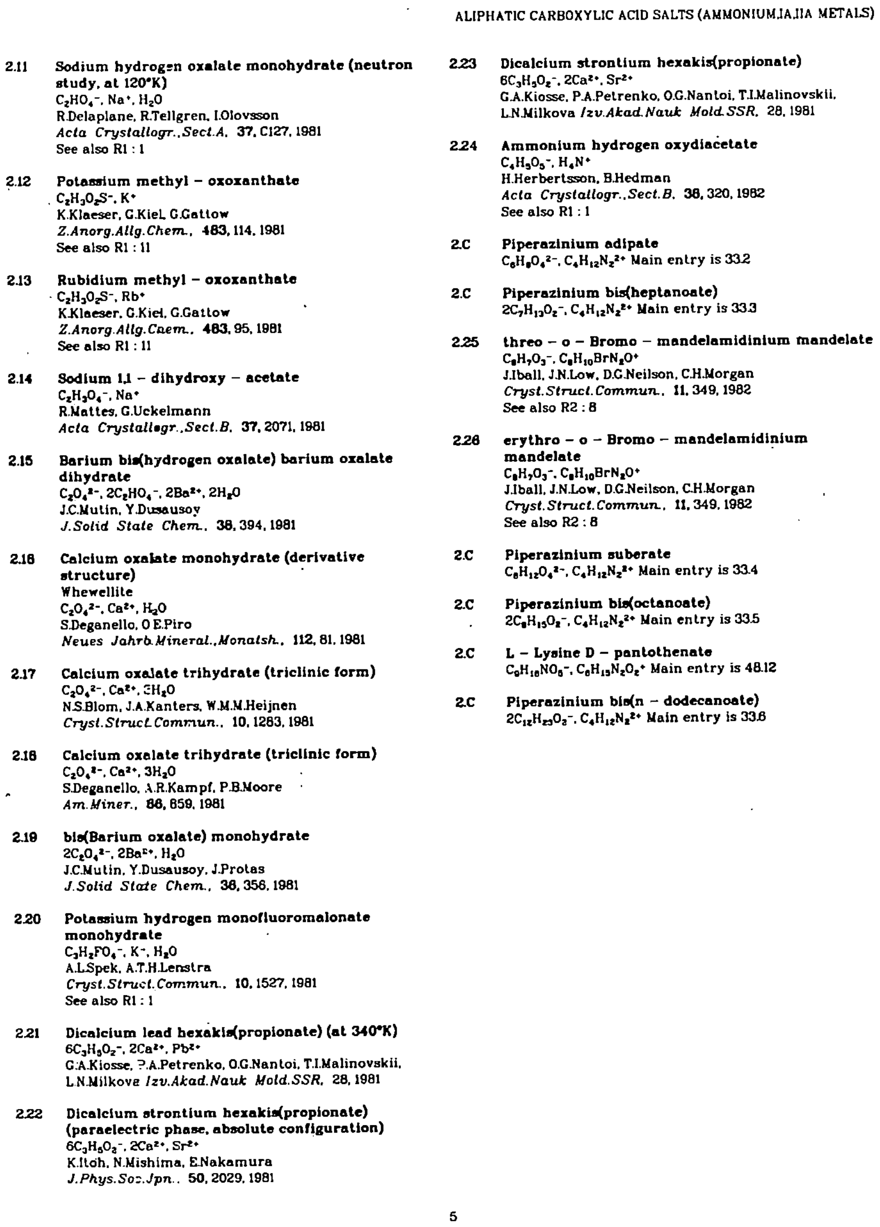


ALIPHATIC CARBOXYLIC ACID SALTS (AMMONIUM,IA,IIA METALS)

2.11 **Sodium hydrogen oxalate monohydrate (neutron study, at 120°K)**
$C_2HO_4^-$, Na^+, H_2O
R.Delaplane, R.Tellgren, I.Olovsson
Acta Crystallogr.,Sect.A, 37, C127, 1981
See also R1 : 1

2.12 **Potassium methyl – oxoxanthate**
$C_2H_3O_2S^-$, K^+
K.Klaeser, G.Kiel, G.Gattow
Z.Anorg.Allg.Chem., 483, 114, 1981
See also R1 : 11

2.13 **Rubidium methyl – oxoxanthate**
$C_2H_3O_2S^-$, Rb^+
K.Klaeser, G.Kiel, G.Gattow
Z.Anorg.Allg.Chem., 483, 95, 1981
See also R1 : 11

2.14 **Sodium 1,1 – dihydroxy – acetate**
$C_2H_3O_4^-$, Na^+
R.Mattes, G.Uckelmann
Acta Crystallogr.,Sect.B, 37, 2071, 1981

2.15 **Barium bis(hydrogen oxalate) barium oxalate dihydrate**
$C_2O_4^{2-}$, $2C_2HO_4^-$, $2Ba^{2+}$, $2H_2O$
J.C.Mutin, Y.Dusausoy
J.Solid State Chem., 38, 394, 1981

2.16 **Calcium oxalate monohydrate (derivative structure)**
Whewellite
$C_2O_4^{2-}$, Ca^{2+}, H_2O
S.Deganello, O.E.Piro
Neues Jahrb.Mineral.,Monatsh., 112, 81, 1981

2.17 **Calcium oxalate trihydrate (triclinic form)**
$C_2O_4^{2-}$, Ca^{2+}, $3H_2O$
N.S.Blom, J.A.Kanters, W.M.M.Heijnen
Cryst.Struct.Commun., 10, 1263, 1981

2.18 **Calcium oxalate trihydrate (triclinic form)**
$C_2O_4^{2-}$, Ca^{2+}, $3H_2O$
S.Deganello, A.R.Kampf, P.B.Moore
Am.Miner., 66, 659, 1981

2.19 **bis(Barium oxalate) monohydrate**
$2C_2O_4^{2-}$, $2Ba^{2+}$, H_2O
J.C.Mutin, Y.Dusausoy, J.Protas
J.Solid State Chem., 36, 356, 1981

2.20 **Potassium hydrogen monofluoromalonate monohydrate**
$C_3H_2FO_4^-$, K^+, H_2O
A.L.Spek, A.T.H.Lenstra
Cryst.Struct.Commun., 10, 1527, 1981
See also R1 : 1

2.21 **Dicalcium lead hexakis(propionate) (at 340°K)**
$6C_3H_5O_2^-$, $2Ca^{2+}$, Pb^{2+}
G.A.Kiosse, P.A.Petrenko, O.G.Nantoi, T.I.Malinovskii, L.N.Milkova *Izv.Akad.Nauk Mold.SSR,* 28, 1981

2.22 **Dicalcium strontium hexakis(propionate) (paraelectric phase, absolute configuration)**
$6C_3H_5O_2^-$, $2Ca^{2+}$, Sr^{2+}
K.Itoh, N.Mishima, E.Nakamura
J.Phys.Soc.Jpn., 50, 2029, 1981

2.23 **Dicalcium strontium hexakis(propionate)**
$6C_3H_5O_2^-$, $2Ca^{2+}$, Sr^{2+}
G.A.Kiosse, P.A.Petrenko, O.G.Nantoi, T.I.Malinovskii, L.N.Milkova *Izv.Akad.Nauk Mold.SSR,* 28, 1981

2.24 **Ammonium hydrogen oxydiacetate**
$C_4H_5O_5^-$, H_4N^+
H.Herbertsson, B.Hedman
Acta Crystallogr.,Sect.B, 38, 320, 1982
See also R1 : 1

2.C **Piperazinium adipate**
$C_6H_8O_4^{2-}$, $C_4H_{12}N_2^{2+}$ Main entry is 33.2

2.C **Piperazinium bis(heptanoate)**
$2C_7H_{13}O_2^-$, $C_4H_{12}N_2^{2+}$ Main entry is 33.3

2.25 **threo – o – Bromo – mandelamidinium mandelate**
$C_8H_7O_3^-$, $C_8H_{10}BrN_2O^+$
J.Iball, J.N.Low, D.G.Neilson, C.H.Morgan
Cryst.Struct.Commun., 11, 349, 1982
See also R2 : 8

2.26 **erythro – o – Bromo – mandelamidinium mandelate**
$C_8H_7O_3^-$, $C_8H_{10}BrN_2O^+$
J.Iball, J.N.Low, D.G.Neilson, C.H.Morgan
Cryst.Struct.Commun., 11, 349, 1982
See also R2 : 8

2.C **Piperazinium suberate**
$C_8H_{12}O_4^{2-}$, $C_4H_{12}N_2^{2+}$ Main entry is 33.4

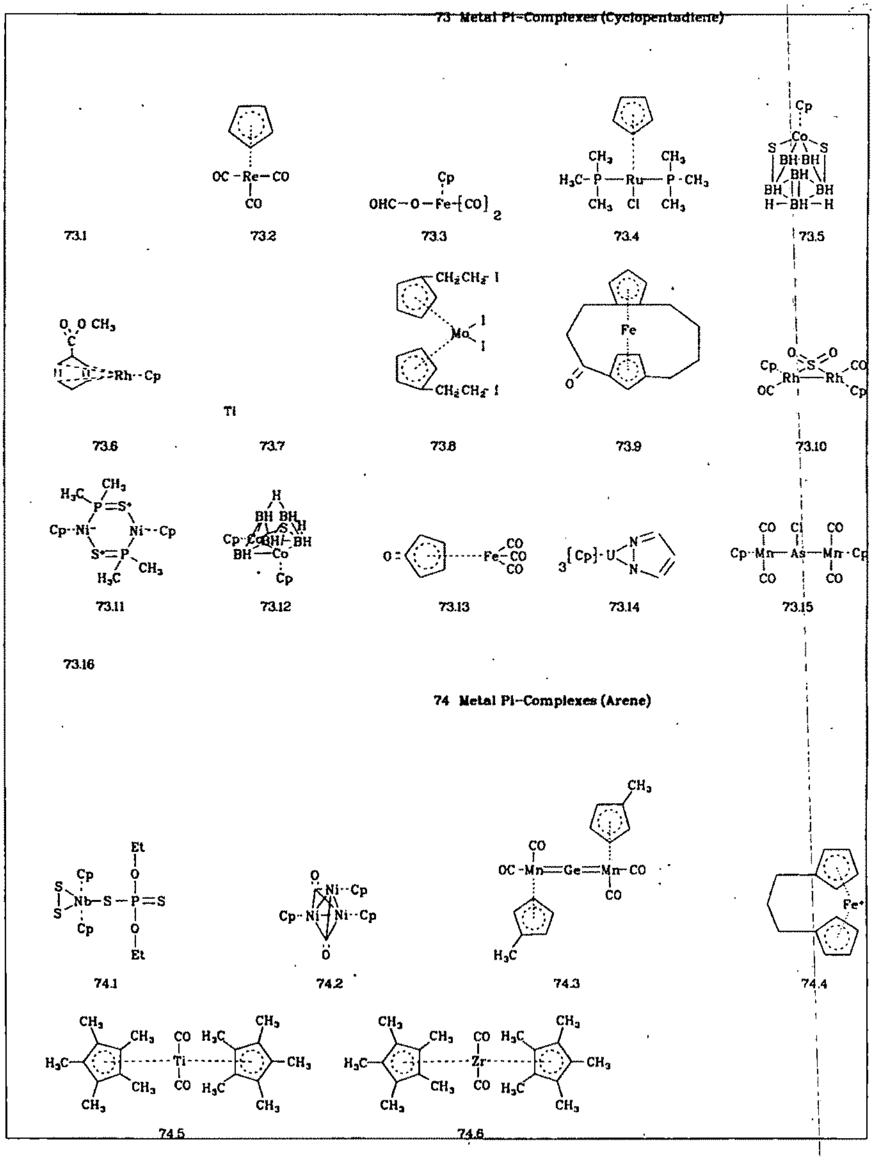
2.C **Piperazinium bis(octanoate)**
$2C_8H_{15}O_2^-$, $C_4H_{12}N_2^{2+}$ Main entry is 33.5

2.C **L – Lysine D – pantothenate**
$C_9H_{16}NO_5^-$, $C_6H_{15}N_2O_2^+$ Main entry is 48.12

2.C **Piperazinium bis(n – dodecanoate)**
$2C_{12}H_{23}O_2^-$, $C_4H_{12}N_2^{2+}$ Main entry is 33.6

5

FIG. 1. *Sample page from the main bibliography*



73 Metal Pi-Complexes (Cyclopentadiene)

73.1 73.2 73.3 73.4 73.5

73.6 73.7 73.8 73.9 73.10

73.11 73.12 73.13 73.14 73.15

73.16

74 Metal Pi-Complexes (Arene)

74.1 74.2 74.3 74.4

74.5 74.6

D 1

FIG. 2. *Sample page from the diagrams index*

Aslib

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COPYRIGHT AND INFORMATION REPACKAGING: OLD PROBLEMS, NEW TECHNOLOGIES

Aslib Seminar, London, 22 June 1983

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Interpretation of copyright law—looking especially at the situation created by the new technology

Denis de Freitas
Chairman, British Copyright Council

Paper presented at the Aslib Seminar, 'Copyright and information repackaging: old problems, new technologies', London, 22 June 1983

Introduction

THE UNDERLYING CONCERN of copyright is with communication; the purpose of the copyright system as it exists today is to stimulate those who have something to communicate—ideas, information, visions—to express them in a form in which they can be communicated to other human beings. The copyright system seeks to encourage authors to write, musicians to compose, artists to paint, and to provide incentives for the dissemination of their output by giving them rights of control over the use to which these forms of expression—literature, music, visual art—may be put by the public. The copyright law today is entirely statutory, subject, of course, to judicial interpretation as and when disputes come before the courts. The present statute is the Copyright Act 1956; its principal effect may be summarised in the following way:

(a) it describes the categories of works or other material which will enjoy copyright protection, provided the individual work complies with certain requirements as to nationality or residence of the author or country of first publication;
(b) it defines the nature of the protection to be enjoyed by each category of works; i.e. the specific rights which the copyright owner may exercise over each category;
(c) it provides for the enforcement of rights by litigation, and subjects the administration of rights in certain cases to a form of compulsory arbitration;
(d) it provides machinery for implementing international arrangements for the reciprocal protection of foreign works in the United Kingdom, and United Kingdom works in foreign countries.

There are four main categories of protected works mentioned in the Act—literary works, dramatic works, musical works, and artistic works. The Act

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also provides that copyright shall subsist in sound recordings, cinematograph films, and broadcasts, but these are not referred to as 'works' but as 'other subject matter'; the purpose of the different language being to underline the fact that these three categories are, so to speak, derivative productions; they normally incorporate literary, dramatic, musical or artistic works.

Copyright is not a single right; it is a bundle of rights and the bundle varies depending on the category of work or other subject matter. Thus, the copyright in literary, dramatic and musical works gives the copyright owner the right to control the following activities:

(a) reproducing the work in any material form;
(b) publishing the work;
(c) performing the work in public;
(d) broadcasting the work;
(e) causing the work to be transmitted to subscribers to a diffusion service;
(f) making any adaptation of the work;
(g) doing in relation to an adaptation of the work any of the other specified activities.

In the case of recordings, for example, the content of the copyright is different; it gives the copyright owner the right to control:

(a) the making of a record embodying the sound recording;
(b) causing the sound recording to be heard in public;
(c) broadcasting the recording.

The Act, as you can see, therefore provides that the copyright in each category shall be specially tailored to meet the needs of the particular category.

The position today

The Copyright Act was drafted in the middle of this century when most of the century's technology had already appeared and, in some cases, was well established. We then had broadcasting, the wired distribution of programmes, high quality sound recording apparatus, photocopying equipment and, I believe, the first generation of computers. It would be true to say, I think, that the ambit of control given to copyright owners by the 1956 Act gave the copyright owners of the various categories adequate control over the forms of use to which their works were then being put to any significant extent by the public. Today the scene is transformed, not so much because there are new technologies in operation but because the technologies of the Fifties have been perfected in various ways so that the dimensions of use of copyright works is on a totally different scale today than it was in the middle of the century.

Today, broadcasting is not simply the emission by a terrestrial transmitter of signals carrying programmes destined for the direct reception by individually operated receivers in the national territory of the broadcasting service, but broadcasting via satellite is becoming the norm and this enables programmes to be received not only in the country in which the originating broadcaster is situated but in many other countries; and associated with this extension of broadcasting technology is the growing development of cable television systems. In continental Europe, networks of cable television systems have sprung up carrying a multiplicity of foreign broadcast programmes; for example, in Belgium there are over 40 cable systems each carrying, in addition to Belgian programmes, something like 16 national television services from France, Germany, the Netherlands, and the United Kingdom.

Let us look at photocopying; here the technology has advanced to produce equipment that is simplicity to operate, inexpensive to acquire and use, and available in a variety of configurations to suit every conceivable user need, so that it has become almost as ubiquitous as the transistor radio, to be found no longer only in major public libraries, one or two schools and large offices, but in virtually every library, every school and every office employing more than, perhaps, 10 people. The volume of photocopying done by these vast numbers of photocopiers is, naturally, correspondingly large; the Publishers Association has estimated that the amount of photocopying in schools each year amounts to the equivalent of about one million books.

At this stage I must make an important point. You may have detected in what I have been saying a note of concern—concern for the interests of the authors and their publishers. I must emphasise that the concern is not at what is happening technologically; there is no desire on the part of authors and publishers to halt technological advance or to deny the public the benefits of technology; the sole concern of the authors and publishers is that they too should enjoy some measure of benefit from these 20th century wizardries, instead of being the one sector of society whose interests are disadvantaged.

Technological growth

Apart from the reproduction of literary works by photocopying, of course the reproduction of musical works and sound recordings by tape recorders has been possible for several decades, and home recording on a considerable scale has been going on for a long time. Until recently the music industry had done little about it. There were two reasons for this, I think; in the first place, in the Sixties and early Seventies the music industry was enjoying a phenomenal boom and was, misguidedly, unconcerned about the erosion of their interests represented by growing home-taping. The second reason—a more fundamental one—is the difficulty of obtaining evidence to establish particular cases of home taping on which infringement proceedings could be brought.

In the Eighties the latest addition to the reproduction facilities available to the public (in the copyright sense) is the video-recorder. The growth of this technology, its application and its use—both legitimate and illegitimate—has been phenomenal. Most video-recorders are still being manufactured in Japan; the output in that country in 1977 was 763,000 units; in 1981 it was 9.54m, and in 1982 it was expected to reach 15 to 15½m. Video recording equipment offers the user two facilities. As you know, it is used in conjunction with a conventional television set. One facility is that a programme received by the television set can be recorded on a video recorder for subsequent showing, and the recording can take place while another programme is actually being received and seen on the screen and, like modern ovens, the recorder can be pre-set to record programmes which are broadcast within anything up to fourteen days ahead in the absence of anyone in the house where the television set is.

The other facility offered by video-recording equipment is that pre-recorded tapes may be purchased or rented and shown on the television screen. This has spawned a vast new industry producing pre-recorded video tapes, mostly of films made for the cinema but including a significant proportion of originally produced material, some of it pornographic. The United Kingdom is regarded as one of the world's leaders of video piracy, but in this seminar I do not propose to discuss that in any detail as I assume the interest here is more particularly focused on literary works.

Finally, computer technology. The impact of this art on the copyright system is complex and substantial and really requires a conference of its own to enable it to be properly examined. The capacity of computers for storing, processing, retrieving and presenting not only visually on a screen but in forms of material printout, literary and other categories of works clearly create considerable and complex problems for copyright owners, and more so when account is taken of the international implications resulting from intercountry links such as EuroNet.

The effect of contemporary technology may be summed up, therefore, as having placed in the hands of the public equipment by which facsimile copies of literary, dramatic and even artistic works may be made easily and cheaply and in unlimited numbers; and that the use of these facilities by institutions, corporate bodies and other enterprises, both in the public and private sector, results in a scale of use quite uncontemplated 25 years ago.

Control of copying

I wish to go back to my earlier reference to the ambit of control which the 1956 Act gives to the copyright owner—the rights to control the reproduction, publishing, public performance, broadcasting, diffusion and adaptation of a work, and to say, subject to one or two special problems, that, in principle, that measure of control should be adequate to deal with the forms of use which are currently taking place by means of technology. The use of photocopying equipment, of audio and video recording equipment, the transmission by broadcasting services over cable television networks, even the use of computer systems, are all forms of use which as a matter of law would appear to be covered by s.2(5) of the Act and which, if the permission of the copyright owner has not been obtained in advance, amount to infringements in respect of which he may bring an action; or, indeed, in respect of which a criminal prosecution might be brought; but in practice the situation is different.

While it may be an accurate statement of fact to say that large numbers of literary works are reproduced daily by photocopying machines in schools, libraries, and so on, an infringement action can only be brought if evidence admissible in court is available of exactly which works have been copied, supported by evidence that those works in question were protected by copyright, i.e. that they had been made by qualified persons or had been first published in the United Kingdom or in a country to which the Copyright Act had been extended, and that the period of protection had not expired. One or two cases have been successfully brought by copyright owners of musical works, but the task of monitoring comprehensively the use of photocopying equipment, much of which is not on premises to which the public at large have access, clearly presents formidable practical problems. And quite apart from that, it seems a sorry state of affairs if responsible institutions such as libraries, schools and universities staffed by responsible citizens will only respect copyright obligations if forced to do so by court injunction. My personal view is that not only is litigation in such matters a course of action of last resort, but it is an admission of human failure benefitting no one but my profession.

Furthermore, the problems of litigation are compounded by the fact that the copyright owner's right to control the reproduction of his works, is subject to certain exceptions contained in the Act of which perhaps the most important are in ss.6 and 7. Under subsections (1) and (2) of s.6, fair dealing in literary, dramatic and musical works for the purposes of research, private study, criticism or review, is not an infringement; but the Act does not define fair dealing and there is little clear judicial guidance save the proposition that every case turns on its own special circumstances.

Even before considering whether the actual copying which took place may be regarded as 'fair dealing', the plaintiff must establish that what was copied (unless it was the entire work, which in most cases it is not), was a substantial part of the work; and the question whether it is substantial or not is a difficult one; it does not relate so much to quantity as to quality or the importance of the part copied to the work as a whole.

In 1958 the Society of Authors and Publishers Association agreed that they would not regard it as 'unfair dealing' if for purposes of criticism of review a single extract of up to 400 words, or a series of extracts (of which none exceeded 300 words) to a total of 800 words were copied from prose copyright works, or if any extracts up to a total of 40 lines were taken from a poem, provided the extract did not exceed one quarter of the poem.

In 1965 the Society of Authors and Publishers Association agreed that for photocopying they would not regard it as unfair if a single copy was made from a copyright work not exceeding 4,000 words, or a series of extracts of which none exceeded 3,000 words and not exceeding 8,000 words altogether, provided that in no case did the copied extract exceed 10% of the work.

These are two laudable attempts to remove some of the uncertainty in the law, though it is doubtful whether either of those declarations had, or has, any binding legal force; they do at least give an assurance to copiers who keep within the limits that literary copyright owners are unlikely to sue them.

It is abundantly clear that 'substantiality' and 'fair dealing' are far from precise factors and that there must always be a large element of uncertainty when considering whether or not in a given situation a substantial part has been copied or not, and whether the copying was, or was not, fair dealing. It is interesting to note that in the fairly recent United States Copyright Act of 1976 there is a provision stipulating that when a question of fair dealing, which in the United States is described as 'fair use', is before a court, it must take into account four specific factors:

(a) the purpose and character of the use, including whether the use is of a commercial nature or is for non-profit educational purposes;
(b) the nature of the copyrighted work;
(c) the amount and substantiality of the portion used in relation to the copyrighted work as a whole;
(d) the effect of the use upon the potential market for, or the value of, the copyrighted work.

It must also be remembered that when Parliament enacted s.6, it would not have had in contemplation the facilities now available for making copies for these special purposes, nor the numbers in which they are now made.

S.7 of the Act provides that articles from periodicals and published literary, dramatic and musical works may be copied in designated libraries provided certain conditions are complied with, including the requirement that the person receiving the copy requires it for purposes of research or private study and will pay for it.

The existence of these special provisions has two consequences; on the one hand it means that in attempting to monitor the use by libraries of copyright material, copyright owners have to establish not only the identity of the works and their copyright status but also whether the particular use is exempt under s.6 or has complied with the conditions laid down by and under s.7; on the other hand, it imposes on libraries an obligation to set up the necessary administrative arrangements to ensure that the limits of the s.6 exemption are not exceeded or that the conditions in s.7 are complied with.

The present situation

The present position appears to me to be completely unworkable and of benefit neither to copyright owners nor to users. My own view is that the photocopying of copyright material by institutions such as schools and libraries can only be effectively licensed on terms which are fair to both copyright owners and users by a system of blanket licences; and I say this on the basis of my experience as legal adviser to the Performing Right Society for 20 years. Under a comprehensive blanket licensing system the user obtains a licence to virtually the entire repertoire of works he is likely to wish to copy and he is relieved entirely of the administrative expense of finding and applying to the copyright owner of each individual work in advance; the payments to be made can be calculated by whatever formula is agreed in the course of negotiation between licensing body and the user or the association representing the user, and if negotiations fail it should be settled by arbitration. The licensing body will be responsible for distributing payments received from users amongst the individual copyright owners. The one administrative obligation on the user is to maintain a record of works copied and with the aid of modern technology it should be possible for this to be done at an acceptable cost. The Performing Right Society administers the public performance, broadcasting and diffusion rights in the world repertoire of copyright music—somewhere between 10 and 15m works—on behalf of nearly ½m copyright owners around the world, and in 1982 it had an annual turnover of almost £55m.

As regards the reproduction of works protected by copyright by the home taping of music either from borrowed, bought or rented records and discs, or off air from the radio or television set, and the video recording of programmes either off air or from other recordings, it is clear that all this copying constitutes infringements under existing law. It cannot credibly be contended that, save in the most exceptional cases, such recordings are being made either for private research or for study, or for the purposes of criticism or review. Technically, therefore, the copyright owners have the legal means to protect their interests by bringing infringement proceedings, but in practice it is virtually impossible to enforce this right; and the reasons for this are several:

(a) first, because the recording activity takes place at home and not in premises to which the public have access, it is virtually impossible to obtain specific evidence of what has been recorded;
(b) secondly, because of the individual nature of these activities, infringement proceedings can only be brought after the event and while, in theory, an injunction might be obtained to prevent a particular infringer from infringing a particular work in question or possibly the works of the copyright owner who is the plaintiff, such a limited injunction against one individual is not likely to have much general deterrent effect.

In the United States an attempt is being made to establish, as a matter of law, that the manufacturer of video recording equipment capable of being used for making unauthorised recordings at home of works protected by copyright, is jointly liable as an infringer if equipment which he releases to the market is in fact used for this purpose. This is an action brought by Universal and, I think, some other American motion picture companies against Sony, and has become known as the 'Betamax Case'. In the court of first instance the plaintiff lost; but on appeal to a Federal Court of Appeal in California, judgement was given in favour of the plaintiff. There is now an appeal pending in the United States Supreme Court and a decision is expected shortly. Of course, whatever the decision may be, it will be based on United States and not United Kingdom law, but it will undoubtedly be of considerable interest, and possibly relevant to the legal position here. My personal view is that it is unlikely that the appeal court decision will be upheld. It appears to me to be implicit in the plaintiff's contention that it is to be assumed that every individual purchaser of such equipment is going to infringe copyright; it is true that in the Betamax case evidence of unathorised recording of a specific copyright work, a film, was established but when the infringing action took place the manufacturer, Sony, no longer had any control over the equipment; if he is to be made liable, it must surely be based on the state of affairs when he relinquishes control and at that time no infringement had taken place and no specific infringement could be contemplated as being inevitable.

It seems to me that there can be no solution to the problems of private recording other than a statutory one. If it is accepted that there is a large volume of unauthorised copying by the use of tape recorders and video recorders of copyright material—and there is a considerable volume of statistical evidence to this effect—then there is a situation in which one knows that wide-scale infringements are occurring, that these infringements are being committed by a large number of private owners of the equipment, but it is not possible to establish which particular individual owners have done the infringing. In such a situation it does not seem unreasonable to me to require, by statute, that the class of persons who are clearly responsible for the infringing activity pay some appropriate remuneration for distribution amongst the class of copyright owners whose works are being copied; and that the payment should be collected at source, i.e. at the point of delivery of the recording equipment by the manufacturer into the distribution chain and that the manufacturer should then account to an agency representing copyright owners for the amounts collected, and that agency would be responsible for distributing it.

This would seem to meet the realities of the situation in a fair manner; home taping and recording cannot be stopped and there is no good reason why it should be stopped; so the situation should be regularised by, in effect, the grant of a statutory licence so that home tapers and recorders would cease to be infringers. In consideration of this general licence, purchasers of the equipment will, as part of the purchase price, make some reasonable payment to be distributed to the copyright owners whose works may be copied by the equipment; and the manufacturer who has made the recording possible by making the equipment available to the public, should collect the royalty payments and hand them over to the agency for distribution. This is, in effect, the system which has been operating in West Germany since 1966; in that country manufacturers and importers of sound recording equipment are required to pay 5% of the retail selling price over to a distributing organisation, and the proceeds of these payments, now totalling some DM40m per annum, are distributed as to 40% to the German Composers' Society for distribution to composers and music publishers; 40% to the record industry for distribution to the record companies and performers, and 20% to an organisation representing literary interests.

Final comments

As you know, the law of copyright in the United Kingdom has been under official review since 1973 when the Government established a Committee under the chairmanship of Mr Justice Whitford. The British Copyright Council and all other organisations, and a number of individuals, concerned with copyright submitted comprehensive representations to the Committee; it reported in 1977 advocating a complete overhaul of the law and making over 100 specific recommendations. In response to its recommendations all the affected interests submitted their views to Government. It took four years for the Government to publish its own response to the report, which it did in 1981 in the shape of a Green Paper in which, on most major issues, its view was that as yet it had no view; and it invited further representation hoping that this would lead to 'a lively public debate'. So a further round of opinions were expressed and submitted. But today, nearly a year after the August 1982 deadline for the latest round of views and in the year of the tenth anniversary of the establishment of the Whitford Committee, there is still little indication of a genuine intention by Government to accord the subject of copyright a priority and importance in the Government's legislative timetable which the urgency of the reforms needed justify.

‘Public domain’ software

Ray Templeton

Advisory Unit for Computer Based
Education, Hatfield

Paper presented at the Aslib Seminar, 'Copyright and information repackaging: old problems, new technologies', London, 22 June 1983

Introduction

‘PUBLIC DOMAIN’, in its clearly defined legal sense, is a phrase which is used to describe an item, usually a book or a play, which is no longer copyright, i.e. when the author of the item has been dead for 50 years. It is perhaps peculiar, therefore, to see it used to describe computer software, as there cannot be many program writers who fall into this category.

The phrase, however, is in common use within the computer world, to describe those many pieces of software which are in free circulation, and for which no copyright is claimed, or in some cases, where copyright is claimed, but free copying is permitted. In the last year or so, there have been reactions against the use of the phrase, as it is seen by some as being potentially confusing, but nevertheless it is in wide use, and nobody so far has managed to come up with something to replace it.

It is not the purpose of this paper to make any claims for this kind of software, or to say that it has any legal status; rather it is simply to point out that it does exist, and that it gives rise to some peculiar considerations of copyright. In other words I shall probably raise more questions than I shall answer.

Availability of software

The Advisory Unit for Computer Based Education at Hatfield maintains two libraries of microcomputer software. One, which consists mainly of commercially produced materials, is very strictly protected, with no copying permitted. The other includes only programs which may be freely copied, nominally within education, but in practice by anyone who has the appropriate hardware. This library is intended to provide a basis of Computer Aided Learning programs for teachers within the MEP Chiltern Region[1], and there can be no doubt that it does just that, as some of these programs have become familiar old faithfuls in many schools. There is also a network of over seventy distribution contacts for this library in Local Education Authorities

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throughout the country, and this has put these programs into classrooms as far apart as Stornoway and Exeter. The test of a public domain program (as established by this system) is 'Do you flinch when you see a total stranger making a copy of your software?'. All programs have been voluntarily submitted with this in mind.

The library consists mainly of programs that have been written by teachers and LEA staff within Chiltern Region, but in theory anyone could submit a program for inclusion. This system has proved to be an effective means of promoting Computer Aided Learning in a whole variety of subjects across the country. Originally, many of these programs claimed no protection, but in the last year each program has been given a 'front page', which carries a copyright message, for example:

> (c) Copyright Oxfordshire C.C.
> This program may be freely copied.

The seeming contradiction in this is an attempt to encourage *bona fide* free copying, while preventing recipients from claiming copyright for their own purposes (it has been known).

There are a multitude of questions raised by running a library of this kind, but here is one particularly interesting little case. One of the most popular and well-known programs to have been part of this system, is an orienteering game called HIKE, which is used to teach the use of bearings. HIKE has been around for about five years now during which time it was copied by many teachers, and it is included in several collections of 'public domain' software throughout the country. However, in 1983, it was published by the Longman Group as part of a package called 'Hatfield Computer Aided Geography'[2], by arrangement with AUCBE (8 programs with documentation, total price, £40). Obviously, it is no longer included in the AUCBE 'public domain' library, but the original program, which was included, is still in circulation around the country. Can a program in fact be removed from the 'public domain'?

The AUCBE Library is an example of a well organised distribution system for 'public domain' software, but the vast majority of such programs circulate much less formally. Cassettes pass from hand to hand, floppy-disks are copied during Computer Club meetings, empty disks are sent in the post and returned complete with software. A single program can pass through many hands and cover a lot of ground in a surprisingly short space of time, particularly if it is any good.

Computer magazines frequently publish listings of programs which the reader is encouraged to type into his/her machine, and which, it is understood, will probably enter the public domain. Indeed, an index to these kind of programs is published[3], presumably with the intention that library users can request back issues of magazines with a view to obtaining the programs. The number of such magazines increases every day (or so it seems!) and accordingly a large number of programs continues to come into circulation.

These programs are as various as they are many, and include everything from five-line subroutines through substantial games to fairly serious utilities.

There is no point in citing an example of such a program. One need only pick up a copy of one of the many popular computer magazines to find several examples.[4] A possible analogy is a magazine which publishes recipes which then pass into general use (or model plans, or dress patterns).

There is a fairly popular misconception that Telesoftware systems[5] pose difficult copyright problems. This is quite simply not true. The fact that you have acquired a program by this method does not alter whatever copyright status applies. The main difference is that it is impossible to obtain a signature from a purchaser using Telesoftware, and this is commonly used by publishers to protect their software. This, however, is an aspect of Contract law and is virtually irrelevant to copyright. So, the method of distribution is irrelevant—Telesoftware can be used as effectively for the distribution of both commercial and 'public domain' software as can any of the more traditional methods, such as shops, mail order etc.

The two examples featured above indicate that the majority of 'public domain' software is generated by the educational or hobbyist sectors of the computer world. This is possibly true, though it takes no account of the multitude of programs that are no doubt passing from hand to hand for use in industry and commerce, again ranging from small useful subroutines to fairly major items.

I said at the beginning that I make no claims for 'public domain' software. It certainly is true that I have no axe to grind about its quality comparative to the commercial product, other than to say that it is my experience that a high price tag is no guarantee of quality. It should be said, however, that it seems certain that within education and among hobbyists at least, (and therefore by implication in every sector) the free circulation of a number of programs has provided a stimulating environment and has promoted the use of the medium generally. It is definitely the case, as I have already mentioned, that a large number of such programs are in use in classrooms. Commercially published software is expensive, and perhaps most important, it is rarely possible to test and try, or even to view, before you buy. Thus, it is hardly surprising that the public domain is thriving.

An extraordinary amount of impetus in the computing world as a whole has been generated by the enthusiast and the amateur who have invested their time and energy in new ideas and imaginative projects. Although, depressingly, it sometimes seems otherwise, not everyone who can write a BASIC program is also an entrepreneur (just as not everyone who can write his name is a novelist). There may be a lot of programs in free circulation, but it is worth bearing in mind that someone, somewhere did the work that put them there. There is no such thing as a free program.

REFERENCES AND NOTES

1. The Microelectronics Education Programme, (MEP) set up by the Department of Education and Science to provide teacher training in the whole field of Microelectronics, has 14 regional centres, one of which, for the Chiltern Region, is at AUCBE, Endymion Road, Hatfield, AL10 8AU.

2. *Hatfield Computer Aided Geography.* Longman Micro Software, 1983, 2 packs of 4 programs each, £20 each pack.
3. *Small Computer Program Index,* (SCPI) ALLM Books Ltd., 21 Beechcroft Rd., Bushey, Watford, Herts. Six per annum.
4. For example: *Personal Computer World, Practical Computing, Acorn User, BEEBUG, Educational Computing,* etc. Consult *SCPI* (see above) for fuller details.
5. Telesoftware is a general term used to describe any electronic method of distributing computer programs. The two most common are (a) broadcast, e.g. using a television with CEEFAX and (b) telephone, e.g. either direct as in the AUCBE system described above, or via PRESTEL. Both types enable the user to quickly, easily, and in some cases anonymously, obtain microcomputer programs from a remote store or library. The author of this paper will happily provide further information on this topic.

FURTHER READING

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Copyright and computer software: the publishers' view

John Davies

Education Director, The Publishers Association

Paper presented at the Aslib seminar, 'Copyright and information repackaging: old problems, new technologies', London, 22 June 1983

Introduction

THE PUBLISHERS ASSOCIATION has been monitoring developments in new technology as they affect publishing over a period of years. The central forum for discussions has been the Electronic Publishing Committee. Three main areas of electronic publishing have been identified as areas into which traditional publishers will want to extend their activities. These are databases/document delivery systems, video/film publishing and the development of computer software. The Committee has produced a number of publications including an introductory guide to electronic publishing [1], a survey of microcomputers in schools [2], a check-list of opportunities and pitfalls which publishers may encounter [3], and lists of organisations [4] active in the various areas of electronic publishing. These last lists indicated that of 81 organisations currently active in video and online publishing only 6 could be described as traditional publishing firms, so in looking at the market overall, we are talking about the policies of nascent specialist industries as well as those of present publishers in print. As far as databases and document delivery systems are concerned, the activities of the Committee have largely to date concentrated on the establishment of Publishers Databases Limited, a novel co-operative company through which publishers can, through individual shareholdings, invest jointly in setting up their own distribution systems. The brochure [5] of this company is currently available to *bona fide* print publishers on specific request to The Publishers Association.

The development of publishers into video and film publishing is at this moment heavily hampered by widespread commercial piracy and copyright infringement. The United Kingdom's unenviable reputation as a centre of these illegal activities makes quick Government action as much of a certainty as it can ever be over an electorally 'unsexy' issue like copyright. However, the main purpose of this paper is to report on publishers' prevalent attitudes to the production of software programs for individual computers and networks.

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Interpretation of the law

The main thrust of developments has so far been at school level with the inception of the Microelectronics Education Programme and the Scottish Microelectronics Development Project, together with the Department of Industry's successful offer of 50 per cent funding for the purchase of microcomputers in primary and secondary schools. Although the academic, industrial and home computer markets are becoming viable outlets for the sale of software, the school market at present offers the best prospects to publishers. Some of the materials which are currently being sold arise out of the Government sponsored Microelectronics Education Programme, and the copyright is lodged with the Council for Educational Technology, while publishers tender for the publication, marketing and distribution of the project. The Department of Industry is, however, urgently of the opinion that much more software is needed before computer-assisted learning can hope to become an alternative to print resources, and a major responsibility for producing this range of software must of necessity fall upon commercial educational publishers. The protection of copyright in computer software is vital to its commercial development. The law on copyright at present rests solely on the 1956 Copyright Act[6]. This Act was drafted in the far-off days of the Suez Crisis and Grace Kelly's wedding when the microchip was not even a speck on the horizon. It is not surprising therefore that it makes no specific mention of copyright in computer software. Those who produced the Act must, however, be credited with the foresight that keeps future options open. The Act nowhere refers only to printed works but simply to 'works'. The section of the Act which defined the acts restricted by copyright in a literary, dramatic or musical work is Section 2(5) and it lists these as follows:

(a) reproducing the work in any material form;
(b) publishing the work;
(c) performing the work;
(d) broadcasting the work;
(e) causing the work to be transmitted to subscribers to a diffusion service;
(f) making any adaptation of the work;

Computer software programs can clearly be regarded as creative works and consequently intellectual properties in themselves, or, in some cases, adaptations of works.

They are published works disseminated in and from a material format and attain material substance on a terminal. There is a close parallel between them and the broadcast and transmitted materials referred to in the Act. There is thus a good case for saying that their copyrights come within the general statement made in the Act. The elaboration of the restricted acts in Section 2(6) is couched very much in the parlance of 1956, but this section of the Act makes the very definite statement that such elaborations in no way limit the generalities of Section 2(5). This interpretation of the law is supported by the two major documents on copyright which have been presented since the passing of the Act: the Whitford Report[7] of 1977 and the Government Green Paper [8] of 1981. The Whitford Committee was formed to report to the Department of Trade on desirable changes in the law relating to copyright and a chapter of the Report (Chapter 9) was devoted to Computers. The Committee's recommendations were:

(i) All computer programs and other items of computer software which have involved a sufficient degree of skill and/or labour to be considered as works in the normal copyright sense and which have been reduced to writing or other material form from which they can be reproduced should be clearly protected under copyright law, under the provisions for literary and (where appropriate) artistic works. In short, items of computer software should be treated as works and enjoy protection as such.

(ii) In relation to ownership and term of protection, computer programs and compilations of data should be treated in exactly the same way as other copyright works.

(iv) In relation to works produced with the aid of a computer, the author of the output should be the person who devised the instructions and originated the data used to control and condition the computer to produce the particular result.

(v) A majority also recommend that the unauthorised 'use' of computer programs to control or condition the operation of computers should be an infringement.

The Whitford Committee's conclusions are echoed in the Government's Green Paper. The Government proposes:

> 'to make explicit in new legislation that computer programs attract protection under the same conditions as literary works'.

Despite the varied formats in which computer programs may be expressed, the Government considers:

> 'that this should not diminish the protection afforded either to programs or to other computer-stored works, and therefore proposes that copyright protection should extend to works fixed in any form from which they may be reproduced.'

The creator of an original program, should retain control over the use of the program through appropriate licensing terms. The Government leaves two matters open for further debate: the status of a displayed 'page' or print-out and the definition of authorship.

The overall inference of these statements is, however, incontrovertible Copyright in computer software should be protected, must be defended.

Practical options available

So much for the theory. Until the Government backs up its statements with firm legislation, the publishers' protection of copyright has to be based on practical considerations. The possibility of expensively produced material being almost immediately distributed on a wide basis without compensation is so great that all publishers are giving considerable forethought before they make software available as to how they may prevent a commercial disaster.

A number of options are open to the publisher. The production of computer software presents the publisher with a technical opportunity which is not available for print. The material can be 'copy-protected'. The publishers can make it physically difficult or even impossible for a copy to be taken. There are modems of varying degrees of complexity and expensiveness which may be used for this purpose, from one which can be unravelled easily by a capable computer scientist to high security modems which it would not be worth anyone's while to try to dismember. The use of such methods presents desperate problems for the purchaser in terms of back-up copies and detracts from overall marketing, but at least a publisher has the means to make the protection of the product foolproof, or perhaps, in this instance, rogue proof. It is even feasible to add a moral dimension by rewarding an attempt to copy by the loss of the original, an interesting modern variant of the Aesop fable where the dog, in seeking the reflected bone in the water, loses the bone which is in his own mouth.

Another line of approach by the publisher involves the use of contracts and conditions of sale. Here, the purchaser will sign at the time of buying the material an agreement with the vendor to the effect that the use of the material will be limited to a defined constituency, for example to one institution only, and will not be copied beyond this. This system does not offer as strong a guarantee as copy-protection, but at least the signature on the document may act as a caveat on the wider use of the software.

In many cases, publishers can link programs, and indeed make them wholly dependent upon accompanying print materials. The software thus becomes an element in a package which is geared for the use of a specific number of people and priced accordingly. This technique has to be performed with great subtlety. It is not very easy to create software which is incapable of standing alone nor to prevent photocopying of printed materials.

All the above solutions assume that publishers will wish to sell software programs on the same basis to that on which they now market books, as a large number of individual items. They can, however, opt as appropriate for licensing, for a 'rights deal' of the kind which is made between publishers for the republication of books. Here, the initial cost to a network would be very high and would be related to the number of copies of the material which would be likely to appear within the system. Such a deal would involve paying thousands of pounds for one electronic master as opposed to a few pounds for one individual copy. An element of licensing will appear in any scheme. Publishers already make such arrangements with their more honest customers for reprinting rights. It seems unlikely, however, that either publishers or users would be well suited by a system which operated solely on a licensing basis.

There are important ways in which publishers can help themselves, especially by establishing a speedy system for supply and maintenance of software. Photocopying of books often takes place because of the time that will elapse before additional copies arrive. Most software is at present being sold directly by publishers to the customer. While it is possible that booksellers may develop an intermediary role, the fact that there will be a regular direct contact between the purchaser and the provider should mean that problems can be avoided and that there can be some consumer education as to what is and is not permissible.

Should all these options fail, there remains recourse to the law. Through selected cases, publishers can establish the parameters within which software must be used and set out a code of conduct within a legal framework.

Final comment

There is an essential relationship between the protection of copyright and the economics of publishing. If software is to be published, large initial investments will have to be made in its production. Those who make the investments have to see, after a due period of time, a return for their money. There are various ways in which the bread can come back on the waters, through controlled single sales or through licensing arrangements, but it is a *sine qua non* of commerce and industry that such a return must be achieved.

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Photocopying and licensing: the publishers' view

Kenneth Pinnock
John Murray (Publishers) Limited

Paper presented at the Aslib Seminar 'copyright and information repackaging: old problems, new technologies', London, 22 June 1983

The present situation

HISTORY DOES NOT repeat itself, but it sometimes needs to be repeated. What I shall attempt in this paper is to explain what publishers think about the question of copying and copyright, how they have come to hold the views they do hold, and what action they are trying to take or to instigate. An historical approach seems to be the obvious and natural way of doing this—to go back a few years and retrace the path that has brought us to the present. It accords, too, with such qualifications as I possess for talking to you today. I am in no sense an expert on copyright; but I have been deeply involved until a few weeks ago (and even that time is sufficient, in this area, for one to become seriously out of date) in the discussions and negotiations about copying and copyright that publishers have been involved in ever since the time when Whitford was taking evidence and producing his Report.

That Report appeared in 1977, and one very clear strand in it was a recognition that in regard to copying—as in so many other ways—the world had changed drastically in the previous 20 years or so. That is to say, it had changed drastically since 1956, when the present Copyright Act came into force. My own concern is with educational publishing, and much of what I say today will be from that vantage point. This may be in some ways inappropriate, but it is a good one from which to see how publishers have felt and why they have acted as they have done.

Let us look, then, at the section of the Copyright Act which deals with 'the use of copyright material for education'—Section 41. This says that copyright is not infringed if work is reproduced in the course of instruction *otherwise than by the use of a duplicating process*; or if used in examination questions. What had the legislators in mind? Not a 3MS photocopier spewing out sheets like a printing machine, but a Roneo or even a Jellygraph, a device now forgotten but commonly used in education and even in business until the early post-war years.

If, next, we look at Section 6 to see what it has to say about 'fair dealing' with (i.e. fair use of) copyright material for research, private study, criticism

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or review, or reporting in newspapers and periodicals, we find that there is no definition of fair dealing. Why? Surely because, so far at least as private study and research are concerned, there is an implicit assumption that the *mechanical labour* of copying will keep it within reasonable bounds. Those who need clearer definition of fair dealing have to resort to the formulae worked out by the Society of Authors and the Publishers Association, and embodied in the booklet *Photocopying and the Law* published by the British Copyright Council.

The world of Whitford is our world; that of the Act belongs to history. Between 1956 and 1976/7 a revolution took place, and in the Report again and again the consequences of that revolution are recorded. Section 226, for example, explains how photocopying in Swedish schools had reached such proportions that a Commission to study the problem was appointed and a statistical study undertaken. This revealed that, by 1968, in Swedish schools alone 150 million impressions were made by photocopying each year. Of these over 60 per cent involved copies of textbooks and school books, 14 per cent involved copies of newspapers and periodicals and only 3 per cent involved copies of novels, plays and general literature.

Publishers also believe that the framers of the 1956 Act, when they made the regulations covering library copying which are embodied in Section 7 of the Act, cannot possibly have envisaged that on this basis anything like the vast copying service of the British Library would come into existence. Section 7, with its niggling regulations about satisfying the librarian that the copies are for research or private study, paying the full cost including library overheads, and so forth, is a very strange little rock on which to base a huge business which operates world-wide churning out some 20 million *prepaid* copy/pages a year in response to between 1 and 2 million individual requests, many of which must relate to recent and current material. The Publishers Association reckons that this output of copies is equivalent to about 400 scholarly journals of average circulation, and it requires no leap of faith to suppose that the diminishing circulation figures of such journals must be due to some extent to this enormous spate of photocopying.

What one finds in Whitford, then, is a world of copying unforeseen by the legislators of 1956 but fully-fledged by 1977, and quite recognisably the world in which *we* live. But not content with diagnosis, Whitford went on to say what other countries were doing to effect a cure—especially in the field of education. He described the licensing schemes such as the Swedish *Bonus* and the German *Wissenschaft* that, even then, had already been set up. What he was not then able to say was that in Scandinavia governments were prepared to pay compensation for some of the damage already inflicted by unauthorised copying: Norway $40,000 for copying in schools prior to 1977, and Denmark $2 million for such copying in the period 1966–80, a figure which, adjusted for the difference in school populations, would I believe be equivalent to Britain paying at the rate of £4m a year over this period. I mention this not because British publishers are likely to set their sights so high—they know better than that—but because even now one occasionally finds people who question whether copying is *really* damaging. Governments, even in Scandinavia, do not pay compensation for imaginary injuries. The problems we face in Britain are real, and they are international in scope. It was after considering the international situation, in sections 220 to 240 of the Report, that Whitford pinpointed the one solution that had been widely resorted to: blanket licensing, for which he cited the Performing Right Society as a model. To this he returned in greater detail a little later, in Sections 274–290, and it is clear that his committee saw blanket licensing as the best solution, and perhaps the only one that would remain valid despite further technical changes:

> We see no reason why blanket licensing procedures should not continue to provide a workable solution to the reprography problem for many years to come.

As I am speaking to librarians, I feel I ought to remind you—in case there are any who need reminding—of the harsh doctrine that Whitford preached in Section 276:

> Apart from one factor, there is nothing in the present Act to prevent blanket licensing schemes from operating now. The one factor is the existing exception in Section 7 of the 1956 Act allowing the making of single copies, coupled with the low charges which libraries make in practice. We have already discussed the difficulties of deciding what is a single copy (paragraph 243). While this loophole exists there is little incentive for a library to take a licence. The librarian no doubt feels that the law excuses him from any need to do so. We therefore recommend that as and when blanket licensing schemes are in existence, the latitude given by Section 7 should no longer apply. At the same time it should be made clear that Section 6 of the 1956 Act (fair dealing for research or private study) should not allow the making of facsimile copies but only those made by hand or by using a typewriter.

This does not mean, I take it, that post-Whitford there should be no making of photocopies for research or private study, but that the practice should be indulged in only on licensed premises.

This firm recommendation might possibly not have been enough to set publishers and other owners and controllers of copyright firmly on the road to blanket licensing. But Whitford did not leave the matter there. In Sections 278–9 he urged that after due time for negotiations there should be in effect a free-for-all, in which reprography should not be regarded as infringement of copyright, unless a blanket licensing scheme had been promulgated.

The publishers' response

Whitford provided publishers, then, with both stick and carrot, and they could hardly fail to respond. But it should not be thought that this response has been a simple and automatic matter. In order to come to terms with the users, the Publishers Association took the initiative in setting up a committee under the chairmanship of Lord Wolfenden, representing publishers of books, magazines and scholarly journals, together with the authors' associations, which laboured for four years to devise a licensing scheme. It considered in great detail the possibility of establishing the licence on a capitation basis, but eventually came down firmly in favour of a transactional basis, by which payments would be determined by the number of copies made, not the size of the population licensed to copy. As finally drafted, the licence provided that, once an initial registration fee had been paid, copies should be paid for at a set fee per page per copy (four pence for books, ten pence for periodicals, with schools getting everything at only two pence). These fees were calculated in 1979 (and have not since been amended) on the basis of analyses of the actual per-page costs at published prices of substantial samples of printed books and periodicals of the relevant kinds. Records would have to be kept and periodic payment made. Certain classes of works—maps, tables, worksheets etc.—were excluded from the scheme because of their vulnerability to copying. And finally the licence contained a guarantee of indemnity for licensees against liability for infringement of the copyrights of any publishers not participating in the scheme.

What publishers have been interested in all along has been control rather than revenue. For this reason, had the Wolfenden Committee been able to persuade the user bodies to take a real interest in a capitation-based licence, it would I think have been tremendously difficult and perhaps impossible for publishers to agree. But amongst the users the one section, the Scottish local authorities, who came nearest to accepting licensing—and who only desisted, largely as a result of mounting financial pressures, at a very late stage in negotiations—wanted a transactional and not a capitation basis. The reason was simple: the latter, they reckoned, would only encourage copying of a wasteful and educationally dubious kind, while the former would put the brake on copying.

I have said that what publishers wanted all along was control rather than revenue and that the idea of a capitation-based licence was unwelcome to them. How do I know this? The answer is that ever since Whitford an intensive programme of consultation has gone on within the publishing industry. Periodically the question of licensing has been put to the membership of the Publishers Association and the views of individual firms elicited. As the PA's policy has evolved, its reception has been tested by means of questionnaires. In 1977 the members of the Educational Publishers Council voted 47–3 in favour of the PA's activity and plans at that date; in the following years the University and College section of the PA did so 42–0; in 1979 the PA membership as a whole voted 104–20 in favour of licensing as then formulated; and further consultation in 1980 brought a similar majority of 103–16. When, however, the transactional licence was put to PA members in its virtually final form at the end of 1982, the vote was about 100–1; and I believe the one dissentient was a religious publisher who, while agreeing with the scheme in general, could not conscientiously consent to any kind of impediment to the unrestricted spread, even by photocopying, of the Word.

Publishers are above all individualists. When, recently, a 'Code of Practice' was drawn up by the PA which attempted to define what was 'fair practice' between publishers and authors, it went through twelve drafts before reaching its final form. To have moved publishers *en masse* to a point where they are all virtually in agreement is no small achievement; and any who might feel disposed to argue that the present position, so laboriously achieved, needed to be abandoned in favour of some other, would have to take account of the fact that yet another effort of conversion, spread over five or six years, would be entailed.

Photocopying and education

Concurrently with the thinking and discussion that have gone on within publishing, there has been a serious attempt to ascertain the facts about copying. With PA support, the Council for Educational Technology conducted a survey in 1973 (issued in 1975) of copying in 17 primary and 49 secondary schools; and in 1979–80 a similar survey was carried out in 26 schools and colleges in Scotland, with about 30,000 pupils and students. These surveys gave a vivid insight into some of the individual acts of copying that sometimes take place, and the overall picture to be drawn from them was a sombre one. The CET survey showed 262,000 copies made of publications (46 per cent of these being school coursebooks) in 49 secondary schools over a period of 7 weeks; and the introduction to the Scottish survey includes the comment that:

> It was not uncommon for one act of multiple copying to produce copies to the number of 80; one school ran to 500 and 600 copies at one recorded transaction, with several producing 300 each; several schools and institutions recorded on several occasions copying a 'whole book', 'all pages', etc. (each counted in the analysis as one act of multiple copying).

By extension, these two surveys indicated that the total amount of copying of copyright material in education below the tertiary level is in the order of 200 million page/copies a year. It is true that for the period of each of these surveys, the institutions concerned were given an indemnity against prosecution, and so many have made hay while the sun shone. It is also true that the local authorities feel, or say, that much of the copying that goes on is of so trivial a kind that it is outside the limits of the law (and as to where those limits lie, they seem to be in fundamental disagreement with the publishers). But however much such points may be brought up to blur the edges, no one can deny that there is here a major problem of unauthorised use. Even if these surveys had not taken place, and even if evidence from other countries did not confirm the findings of these surveys to the hilt, publishers would be convinced by the mass of circumstantial evidence that comes into their hands of schoolbooks and workbooks, of university 'course papers' sometimes running to hundreds of pages in multiple copies, and so forth. Two prosecutions, both relating to music, have won substantial damages in recent years; but other cases of infringement have been settled out of court in preference to incurring the great hazards and expense of legal action.

What is the root of the problem? To some extent, it is a deliberate and probably a growing tendency to flout the law. Our representatives visiting schools *do* regularly meet teachers who say outright that they will buy a copy of this or that to photocopy. Not infrequently the argument is used, in print and not just verbally, that the needs of the children, must override the interests of publishers (and, by implication, of authors too, though that part of the equation tends to be omitted). The Publishers Association *has* had to discourage a headteacher in Bedfordshire who announced his intention of installing a printing press costing several thousand pounds in order to print his own textbooks—and clearly by 'print' he meant 'reprint'.

But such attitudes are characteristic, I am sure, of only a minority of teachers and a much smaller minority of librarians. Most want to toe the line, but the difficulty is to know where the line is. Some local authorities have done a good job in recent years in informing their teachers (or at least their head teachers) of the elements of copyright law. One chairman today, Geoff Crabb, produced some years ago a splendid algorithm (or flowchart) setting out the procedure for getting permission to copy: its one fault, perhaps, was that it was too perfect—too long and expensive—to get into the hands of the average teacher. During the past year, the Educational Publishers Council issued a leaflet summarising the law of copyright as it relates to schools in the form of seven questions and answers, with a final one-page flow-chart for those who read diagrams better than words. This was intended merely as a roneoed handout for enquirers by post; but after being printed at first in hundreds it has now been issued in thousands. The moral is clear: the teachers both need and want information, in as simple a form as possible, about copyright procedures. But even with such help, they will find themselves at times baffled by the complexities, and hampered by the tediousness and delays, of the present system. Instead of having to wrestle with a rusty old padlock, they need a pass—a licence.

Licensing

It is this licence that publishers and authors are currently trying to provide. Having, through the Wolfenden Committee, determined the form of the licence, they have set up the machinery to offer and administer it. Some eighteen months ago the publishers of books (Publishers Association), of periodicals (Periodical Publishers Association) and of learned journals (Association of Learned and Professional Society Publishers) jointly formed the Publishers Licensing Society, as a counterpart to the already existing Authors' Lending and Copyright Society. These two bodies, PLS and ALCS, each formulated their own policies and then came together in the Copyright Licensing Agency in which differences of policy are resolved and procedures agreed for the issuing of licences and the collection and distribution of fees.

The setting-up of the Copyright Licensing Agency must be seen as a decisive step along the road to blanket licensing that Whitford indicated years ago, and which has recently been endorsed by the Government Green Paper on Copyright Reform. So far as book publishers are concerned, approval of this step was given enthusiastically last December, when a well-attended meeting of members heard an account of the past history and current plans in regard to licensing, endorsed by an almost unanimous vote the terms of the licence which had been circulated to them, and undertook to get their authors to mandate the transfer of reprographic rights from the publishers themselves to the Publishers Licensing Society.

What, then, are the tasks and the problems of the Copyright Licensing Agency?

First, it has to offer the Wolfenden licence to users. To begin with, it seems likely to concentrate on schools and universities, but before long it will be tackling industry and commerce, including copying shops. Libraries, except those in universities, will not I think be high on its list of priorities, because its primary concern is with *multiple* copying.

Although the rates of payment will vary according to the class of user, CLA will try to offer the Wolfenden licence with otherwise as little variation in form as possible. But it will be prepared to listen to arguments concerning minor changes; though its answer to many of these may be that the licence is to last for only two years, a trial period during which lessons will be sought and taken to heart.

Secondly, CLA has to work out many administrative matters which are not spelt out in the licence itself. The licence provides, for instance, that full records must be kept, but does not specify the exact form of the records; nor are arrangements for the return and analysis of the records specified in the licence. Much thought and discussion have gone into these matters.

So much for the tasks. What of the problems?

To begin with, there is the problem of bringing the idea of the constituent members of PLS and CLA (and no doubt of ALCS) to a common focus. To some scholarly publishers, for example, dissemination seems more important than control; to most book publishers, control is the primary objective, taking precedence over revenue. Such tensions are natural and inevitable, and so far it has proved possible to bring them to equilibrium within CLA.

The main problems that CLA faces, however, seem to be external rather than internal. Quite predictably, the first reaction of universities and local authorities to the offer of the licence has been that, at a time of unparalleled financial stringency, new costs can be met only by savings in other directions. In short, licence fees would mean fewer books purchased. Further, there is horror at the thought of the administrative burden of keeping and returning records, when every effort is being made to cut down administrative and financial staff. The answer of publishers to this is that reasonably complete records are an indispensable basis for the legal indemnity which forms a valuable part of the licence: if one goes, the other must be abandoned also.

Another objection raised in the early stages of negotiation is that the licence purports to grant rights which the users already possess under the 'fair dealing' provisions of the Act. The answer to this is that the licence offers a very cheap and advantageous 'package deal' which users will find wonderfully simple to understand and operate—in contrast to the present system. If, however, all fair dealing is to be codified and excluded from the licence, one returns to something like the briar-patch we are now in. And CLA has demonstrated this point by defining 'fair dealing', as it sees it, in a page or two of tight typescript.

It has to be admitted, in fact, that the vagueness and complexities of the present law present a real threat to the attempt to set up a licensing system. By depending on strained interpretations of certain phrases in the Act, it is possible for users to argue—even, just possibly, to convince themselves—that their right to make single and multiple copies is considerably greater than it is in fact on any reasonable interpretation of the Act. (By the word 'reasonable', you will understand that I mean 'publisher's'). In the publishers' view, the licence embodies many concessions to users; and CLA is no doubt prepared to make some further small concessions if these would facilitate the setting up of the new system. But when you have two parties who each take a totally different view of the value of the article about which they are negotiating, there can be no basis for an agreement, since any concessions made by the one will be regarded as admissions of right by the other. This seems to be the situation that CLA currently faces in regard to the local authorities—at least, the English ones; and if this persists, the only remedy seems to be a new copyright law, or possibly a case at law, which will resolve the actual or claimed obscurity of the present Act, and in particular the meaning of the words 'substantial part' in Section 49.

If I end on an indeterminate note, therefore, this reflects no lack of conviction or resolve on the part of publishers, but only the fact that there are obstacles still to be overcome. But I hope that at least I have managed to give you some idea of how publishers have arrived at the conclusions they have collectively endorsed, and why they have chosen the particular lines of action on which they have embarked. I may even perhaps have been able to make the point that there is amongst publishers no deep-laid plot to assault the long-established liberties of scholars and students, but that what has been proposed in regard to single copies is simply in line with Whitford and his view of the practicalities of licensing.

Some of you may recall the story with which Scott rounds off the second volume of *Guy Mannering*. He tells of a museum keeper in Scotland who used to show the sword with which Baalam intended to kill his ass. When someone objected that Baalam had never had a sword, but had merely wished for one, the keeper readily agreed. This, he said, was the very sword that Baalam *wished* to have.

In saying so much about wishes, plans and intentions rather than actualities, I perhaps am rather in the position of Scott's museum keeper: if so, it is of necessity, and I hope you will forgive me.

Reprography and copyright with particular reference to inter-library lending activities—a view from the BLLD

D. N. Wood

British Library Lending Division

Paper presented at the Aslib seminar, 'Copyright and information repackaging: old problems, new technologies', London, 22 June 1983

Introduction

THE BRITISH LIBRARY Lending Division has been involved in the copyright debate for some time. The Division comes up against copyright issues in a number of areas of activity—collection development, conservation, translating and bibliographic. Not surprisingly however, most controversy and discussion has centred around its reprographic activities. It is eight years ago since Line and Wood published their article 'The effect of a large scale photocopying service on journal sales'[1] and it is interesting that many of the points which were made at that time remain valid. This article looked specifically at the activities of the Lending Division but the arguments used could easily have been made in defence of inter-library lending (ILL) activities in general.

The first point to make in connection with this issue is that no one has really established just how much and what sort of copying is carried out in the UK. The wherewithal is certainly there—practically every office and library in the country is equipped with machines that can provide first class copies at the touch of a button but how many of them are used in the reproduction of copyrighted material and in contravention of the law has certainly not been established. In the US, attempts have been made and publishers have been rubbing their hands together at the prospect of collectively receiving royalties amounting to millions of dollars once these illegal practices have been brought under control. How realistic their expectations are remains to be seen.

But to return to the UK and to ILL services in particular. The amount of copying in this area is nowhere near as great as some people believe and consequently even if some form of royalty payment was involved it is unlikely to lead to a huge additional income for publishers or persuade libraries to buy journals rather than acquire copies from elsewhere.

Aslib Proceedings, **35** (11/12), Nov/Dec 1983, p.457–467. Printed in Great Britain

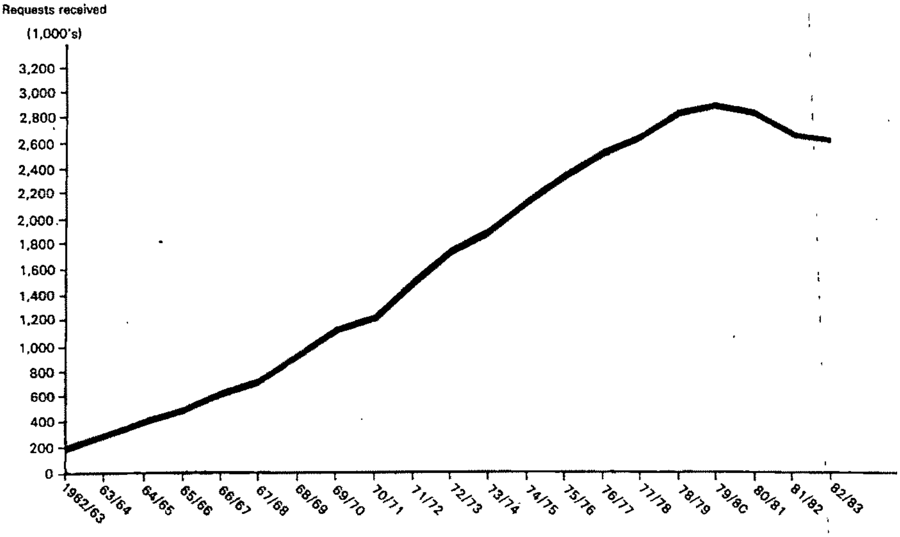
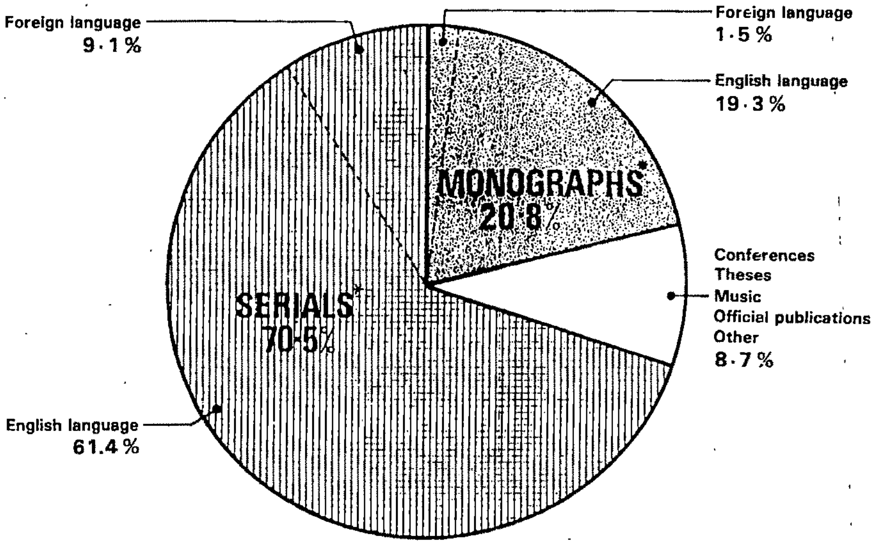


FIG. 1. *Inter-library loan demand at the BLLD*



*including monographs in series and reports (serial)

*including reports (monographs)

FIG. 2. *Forms of materials requested from the BLLD*

The British Library Lending Division
It has been estimated that the BLLD deals with 75% of the total ILL traffic in the UK and so a look at the activities at Boston Spa will probably give a fairly accurate picture of the nature of ILL.

The service began in 1962 with the official opening of the National Lending Library for Science and Technology. In 1967 social science periodicals started to be collected and with the creation of the British Library in 1973 the scope of the collection was increased to embrace the humanities. As will be seen from Figure 1 the demand on the collection rose steadily over the years until 1979–80, when it reached almost 3 million. Since then a slight decline has occurred. The bulk of this demand comes from the UK where there are just over 5,000 registered organisational users. 20% comes from overseas.

Over seventy per cent of the demand is for serials (see Fig 2) and 76% of this demand is satisfied through the provision of photocopies. Other interesting statistics relevant to the copyright debate are that over 50% of the demand

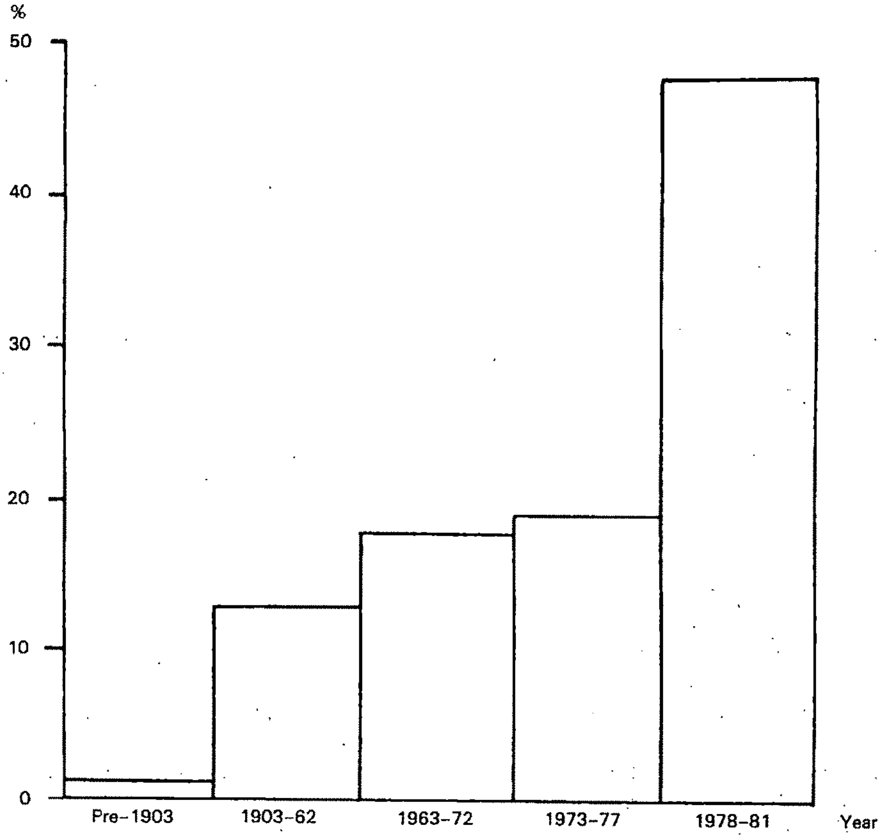


FIG. 3. *Date distribution of serial requests received at BLLD*

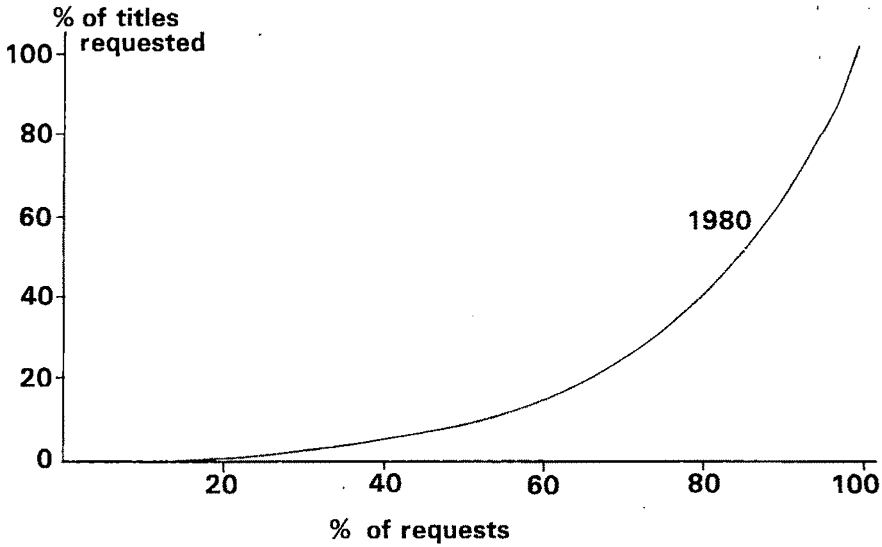


FIG. 4. *Distribution of requests over titles at BLLD*

for serials is for material more than 4 years old (see Fig 3) and that a very small number of titles accounts for a significant proportion of the demand (Fig 4).

The Division provides its services under the terms of the fair-dealing clause of the UK copyright act of 1956. What does this mean in practice? Firstly, it means that all users must make a declaration that any photocopies supplied by the Library are required for the purpose of research or private study. Secondly, the Library will not provide more than one copy of a particular article to any one individual, i.e. multiple copying does not take place. Thirdly, not more than one article per issue will be provided for any one user and finally, no more than one chapter of a book will be copied for any one individual.

Libraries and resources

Most libraries provide ILL services on the same basis as BLLD although what happens *inside* institutions is another matter and one has to admit that disturbing stories have appeared in the press about the extent of multiple copying in some organisations—particularly educational institutions. Despite these however, most libraries do subscribe to the spirit of the law and certainly most coin operated photocopying machines available in libraries for the use of the general public carry notices reminding users of the copying regulations. The one in the Reading Room at Boston Spa is illustrated in Figure 5.

PHOTOCOPYING & COPYRIGHT

ARE YOU WITHIN THE LAW?

Photocopies may be made only within the terms of the Copyright Act (1956). The main provisions are:

(1) Complete works may not be copied without the permission of the copyright owner *except that:*
  — one copy of a journal article may be made for the purposes or research or private study.
  — short extracts (10% of the work, up to a maximum of 4,000 words) may be copied.
(2) One article only per journal issue may be copied.
(3) Multiple copies must *not* be made without the prior written permission of the copyright owner.

Reading Room staff may at their discretion make spot checks of visitors copying. If copyright is being infringed, staff will refuse visitors use of the machine.

Please consult the staff if you are in doubt about copying material.

FIG. 5. *Sample notice to photocopier users*

Despite the fact that the majority of libraries attempt to govern copying in accordance with the law, librarians in general and the Lending Division in particular have been under regular attack from the publishing fraternity. These attacks have been on both economic and moral grounds.

The economic case is based on the assumption that ILL schemes lead to fewer journals being bought, and therefore fewer titles being published. The whole system of scientific communcation is thereby undermined, the quality of research and development diminishes and technological and academic progress becomes a thing of the past. However, it has yet to be demonstrated that the acquisitions budgets of libraries have been directly affected by ILL activities. The Aslib report by Woodward[2] produced under guidance from a BL/STM Working Party looked for some positive correlation between falling subscriptions and increasing use of BLLD but failed to find it. This was hardly surprising since librarians have no overriding commitment to rationalisation. They are in the business of developing local collections to the best of their abilities and to the limits which local finance will allow and they turn to the Lending Division and other libraries only as a last resort.

This reluctance on the part of most librarians to think in resource sharing terms is underlined by recent reports of serial cancellation exercises in libraries which suggest that availability elsewhere is only one and certainly not an overriding criterion in deciding which titles a library should cancel. Local use data coupled with the subjective views of research workers appears to be more important. It is also worth noting at this juncture that an average priced title which is used even as little as five or six times per year is unlikely to be cancelled since the cost of an ILL transaction is such that it is cheaper to continue to subscribe than to order the copies. What publishers shoud be doing is working harder at filling their journals with information that people will use, rather than complaining about the death rate of journals which should perhaps never have been born in the first place.

Although overall budgets have probably not been adversely affected by ILL services the availability of photocopying services from places like BLLD might have been expected to influence the book/journal budget ratios of libraries. However, even this does not seem to have happened. In fact the trend over the last 20 years has favoured journal rather than book purchases. The ratio of book to periodical expenditure in British universities for instance was 2.10 in 1960–61 and only 1.05 in 1979–80. (See Figure 6.)

Year	Ratio
1960–61	2.10
1965–66	1.84
1970–71	1.46
1975–76	1.14
1979–80	1.05

FIG. 6. *Ratio of book to periodical expenditure in British University libraries*

Further evidence from the academic sector suggests that not only have libraries not been constrained because of resource sharing opportunities, they have actually increased their budgets at the expense of other activities. In 1950, library expenditure accounted for 3.7% of total UK university expenditure. In 1979–80 it was 4.2%[3].

The same picture emerges from the United States, where between 1976–80 library budgets are reported to have increased faster than the general rate of inflation. It seems likely that what has prevented libraries buying more is not the existence of the BLLD or the attempt of local administrations to make their libraries more cost effective but the sheer price of the material on the market. The rate of increase of journal prices over the last 10 years has far outstripped overall inflation. The result is, for instance, that 'a large academic library which subscribed to a broad range of journals and whose acquisitions budget has increased between 1967 and 1979 at the general rate of inflation would be able to purchase only 62% of the journals it could have purchased 12 years earlier'.[4]

In this context it is interesting to note from the latest Blackwell's survey of periodical prices[5] that the average price of biophysics, biochemistry and microbiology journals in their sample is now a staggering £301.14 and of chemistry journals £262.43.

What the BLLD and other similar systems have done is to make it easier for libaries to live within their budgets and to provide their users with services which otherwise would not be available.

Despite the financial predicament in which libraries have found themselves and despite the resource sharing schemes which have developed to help them survive, the publishers do not seem to have fared too badly. The latest reports from King Research Inc in the US[6] show that the number of scientific and technical journal titles has increased from 5,800 to 7,600 in just 4 years. Furthermore only 14.5% of titles experienced a decline in circulation during the same period. 40% actually increased their circulations.

To be fair, there has recently been a growing tendency for the publishing fraternity to concede that the effect of ILL services on their business has not been as great as was first thought. This argument is being abandoned gradually in favour of others such as the natural right to payment for the use of copyrighted material. However, publishers themselves have shown no real interest in maintaining extensive back runs of their periodicals and in supplying copies quickly on demand, and it seems unreasonable that they should wish to charge non-profit making institutions such as libraries for doing what would be uneconomic for them to do themselves.

In any case if resort is to be made to moral arguments, is it not time that some publishers put their own houses in order? It is surely time that the real owners of the intellectual property, the authors, received some reward from a system which despite the publishers' protests generates large profits for commercial publishing organisations. It seems that the publish-or-perish philosophy is being exploited by some publishers at the expense of those who write the articles, and those organisations which support the research and which incidentally also pay for the library services.

Current demand at BLLD

Let us assume however that the law of the land or some agreed code of practice required libraries to pay for the copies they make. What would be the result? Since the BLLD is often painted as a villain of the piece it is relevant to look at the situation at Boston Spa. It has already been mentioned that demand on the Division is currently running at around 2,700,000 requests per annum and that 75% of them are for serials. Eighty six per cent of these are satisfied from stock but of these 24% are satisfied by loans rather than photocopies. If it is assumed that all these copies were covered by copyright it means that payment would have to be made on 1,320,000 copies per annum. The Division holds 150,000 titles so the average number of copies made per title is 9. However, the demand is not spread evenly. Many titles are never requested and others attract a relatively heavy demand. In fact, 50% of the demand falls on just 2,000 of the most used titles. A list of the top 20 titles is given in Figure 7. It will be seen from this that the titles involved are all leaders in their fields and are precisely those titles which one might expect to find in any major research library. This is true of most of the heavily used journals in the Lending Division and it seems most unlikely, therefore, that the Library's activities are seriously affecting the economic viability of any particular journal. The journal which would benefit most from any royalty payment would be those which are already thriving. Even so, the level of demand is such (~350 requests pa per title) that any reasonable royalty rate would provide very little revenue for any individual publisher. The cumulative effect on the Library, however, would not be so slight and it is almost certain that the money involved would have to be found by cancelling some of the subscriptions to less used material. An alternative effect of a royalty payment for copying might be that more items would be lent rather than copied. This would undoubtedly result in longer waiting lists, i.e. a poorer service and a need for extra copies of some titles. These extra copies, however, would have to be paid for in the same way as royalties, that is by increasing the charges to users or by cancelling subscriptions to less used titles. If the costs were passed on to users they would probably react either by reducing their ILL activity or by cancelling subscriptions themselves. All this is really saying that acquisitions budgets and the ILL network are part of a closed system. If one element of the system is interfered with it affects the other. It is simply not realistic to expect more money to be made available to libraries from outside the system.

Title	Rank
Journal of Chromatography	1
Annals—New York Academy of Sciences	2
Papers—Society of Automotive Engineers	2
Biochimica et Biophysica ACTA	4
Science—New York then Washington	5
ASTM Special Technical Publication	6
Papers—American Society of Mechanical Engineers	6
Lancet—London—	8
Progress in Clinical and Biological Research	8
Journal of Biological Chemistry	10
ACS Symposium Series	11
Journal—Acoustical Society of America	12
Cancer Research	13
Clinica Chimica ACTA	13
Nature—London—	13
Journal—American Chemical Society	16
Analytical Biochemistry	17
British Medical Journal	17
Papers—American Institute of Aeronautics and Astronautics	17
Mutation Research	20

FIG. 7. *Serial use survey: top 20 titles*

The Green Paper on copyright

Turning briefly now to the proposals on copyright legislation contained in the recently issued Green Paper[7] and the effects that they might have on the Lending Division's reprographic activities.

In common with the rest of the library community the BLLD is pleased that the Government seems to have accepted the validity of the fair dealing concept. To have tampered with the basic provisions of sections 6 and 7 would have hindered rather than encouraged the speedy circulation of information. However the Division is sympathetic to the exclusion of so called 'systematic copying' from these sections. Although the term is not defined it is assumed that this means the making of more than one copy of an item at or about the same time. This is not something which the BLLD does anyway. However, if by systematic copying the Government means the making of a copy of a particular article for a series of individuals over a period of time then this would affect the BLLD's services dramatically. Some of the likely effects have been referred to above. Furthermore, although such legislation would be interfering with the speed and quality of the nation's ILL services, the number of photocopies made of any item would not necessarily be reduced. They would, however, be made at greater administrative cost, since instead of receiving copies from the BLLD, users would receive loans (greater postage costs), make copies themselves (higher copying costs) and then return the item (return postage costs).

Another recommendation contained in the Green Paper is that a distinction should be drawn between copies provided for pure research or private study and those provided for the business ends of commercial organisations. From the Library's point of view the main objections to this proposal are that it would be difficult to police, since it would be hard to ascertain the status of particular organisations, and even more difficult to determine the purpose for which each copy was required. It would of course, be the requester rather than the Library who would have to decide into which category his request fell but the BLLD would probably find its administrative costs rising as it found it necessary to process requests from commercial organisations separately from the rest. These costs would almost certainly have to be passed on to users.

What the Green Paper does seem to be urging is that the publishing and user communities should get together and work towards developing a system which both will find acceptable. In accordance with the proposals contained in the Whitford Report and following the work done by the Wolfenden Committee the Paper seems to be encouraging a system of licensing and the copyright holders' response has been to set up the Copyright Licensing Agency to issue photocopying licences to schools, universities and commercial organisations. The licence permits such organisations to copy UK materials without fear of any legal action being taken against them. Needless to say a fee is to be paid and this is to be collected by the Agency. Half the fee will be passed to the newly formed Publishers Licensing Society (PLS) and the other half to the Authors Lending and Copyright Society (ALCS). Whether this development will lead to a disappearance of other arrangements—for example the code of fair practice agreed between composers, publishers and users of music remains to be seen. It cannot be stressed too strongly however that libraries and other such organisations are under no legal obligation to enter into a licensing agreement. The law still permits fair dealing and users of copyrighted material should think very carefully before signing away their rights under this clause of the existing law.

Concluding remarks

For the time being at least the Government seems to be against the idea of national collecting centres such as that set up in the United States—The Copyright Clearance Center. In the case of that organisation voluntary registration by publishers and in effect voluntary payment by users for non-fair use copying has led to an arrangement which is costly to operate and which is poorly supported by both sides. The reasons given for its apparent failure are that users find it impossibly inconvenient to record the number of copies they make and of what and that malpractices are difficult to detect. Because the system provides few returns, publishers cannot bother to register. The lesson is there for all to learn. Any successful system of licensing/collecting must be simple to use and easy to police.

It may be that if the Government wishes to act in this area, if general agreement between users and producers cannot be reached and if attempts to control copying by law prove to be uneconomic and impractical then the only solution may be to impose a tax on reprographic equipment. Such a solution is not always fair to the user and may not produce a fair return to copyright holders, but it may be seen as the only practical outcome. This is certainly seen as a solution in some countries.

Whatever the outcome of the current discussions on copyright in the UK and however foreign governments seek to control the copying of journal articles, librarians and publishers should cease to regard themselves as adversaries. At the end of the day they are operating in the same business of acquiring and distributing information. Libraries need publishers, publishers need libraries, librarians and users need each other as do authors and publishers and it must not be forgotten that authors and library users are the same people. The respective services of libraries and publishers must be seen by both parties as complimentary and not in competition. They must learn to live peacefully together appreciating each other's problems and co-operating in their solutions.

AUTHOR'S NOTE

The views expressed in this paper are those of the author and not necessarily those of the British Library.

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Proceedings of a
Conference of the
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Sciences Group

JUNE 1982

COMPUTERISED SYSTEMS IN LIBRARY AND INFORMATION SERVICES

Editor:
H L Williams

Few institutions have been able to afford mainframe computers specifically to run their internal library or information services, but some have been able to run in-house services using spare capacity on mainframe installed for other purposes, and the advent of the microprocessor has allowed the development of small but powerful computer systems which many information managers can afford. The availability of these new computer systems has stimulated the development of many software packages which are particularly suitable for use by small libraries and information units. Agricultural and biological libraries and information services are no exception to these trends, but Aslib Biological and Agricultural Sciences Group recognised that there were many small library and information units in the UK which were under-informed about current thinking and developments relating to these new systems. This Conference set out to try and reduce this problem by highlighting the experiences of established users of mainframe and microcomputer technology.

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Library and Information Networks in Western Europe

Jack Burkett

There are so many different kinds of organisation — national, regional, and international — active in every subject field and creating a vast amount of new and modified information, that a need exists for guidance in the face of this complexity. Even within some large international organisations, particularly those which have their component divisions geographically scattered, not everything is known by the employee about the body within which he or she works. It was to satisfy this need that the author prepared the present survey, following the style of his earlier publication *Library and Information Networks in the United Kingdom* (Aslib, 1979).

Throughout the international scene, in every discipline and profession, there exists collaboration in activities that engender information. So we arrive at *networking*, a concept that implies connectedness, co-operation, resource-sharing, and relationships at different levels: individual, group, institutional, etc.

There exist many kinds of information network, ranging from information transfer through committee meetings, conferences, seminars and workshops, to computerised database systems. Most organisations, especially the larger ones, use both the people-based systems and the machine-based systems. The present volume deals comprehensively with all of these elements of the international network scene.

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Research and the practitioner

Dissemination of research results within the library-information profession

Peter Lynam, Margaret Slater
and Rennie Walker

The potential market for the end product of research was explored within this project, using self-completed questionnaires. Practitioner attitudes towards and expectations of library-information research emerged with some clarity, so the published findings have not only interest value but also direct applicability to the researcher community.

The two-way communication gap between researcher and practitioner was emphasised by the study. Existence of this communication failure is already well-recognised by practitioner and researcher alike. One hopeful sign, however, was that in spite or because of this gap, practitioners actually wanted increased personal contact with researchers.

In terms of research topics, respondents exhibited an apparently healthy mix of interest in the applications of new and information technology within the field and concern for user needs and man-management. Closer analysis of findings revealed that it was only the sample as a whole that showed this balance. Technology was the prime concern of industrial-commercial practitioners, also of young professionals and new entrants to the field. The human angle and user and staff requirements were of greater interest to practitioners in academic units and public libraries, also to older and managerial level respondents in general.

The research process itself and the formal research report did not emerge unscathed from comparison with other professional activities and media. Detailed findings of this study have further implications for the conduct and presentation of research and for initial selection of research subjects.

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